FEBRUARY
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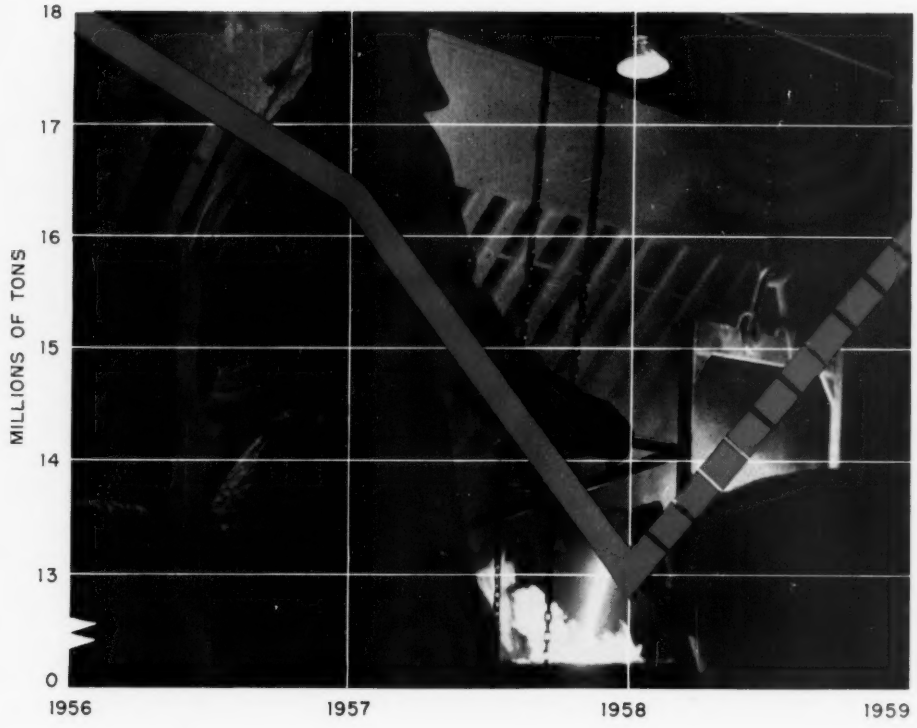
FOUNDRY

A PENTON PUBLICATION



Foundrymen See Upturn in 1959

—Page 101

✔ **Automatic Molding Line Produces Sanitary Ware** —Page 72
✔ **How To Make Incentive Plans Successful** —Page 76
✔ **New Process Makes Patterns from Photographs** —Page 78
✔ **Aluminum Castings Aid in Design of Furniture** —Page 138

CONTENTS — Pages 3-4

ONLY MAGCOBAR HAS ALL FOUR

perfect harmony in your foundry operations

Magcobar
AGRICULTURAL AND INDUSTRIAL PRODUCTS

YELLOWSTONE, Western Bentonite
AUTO BOND, Bentonite for Gray Iron
SOUTHERN STAR, Southern Bentonite
and **MAGCOBAR SERVICE.**

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HOUSTON, TEXAS
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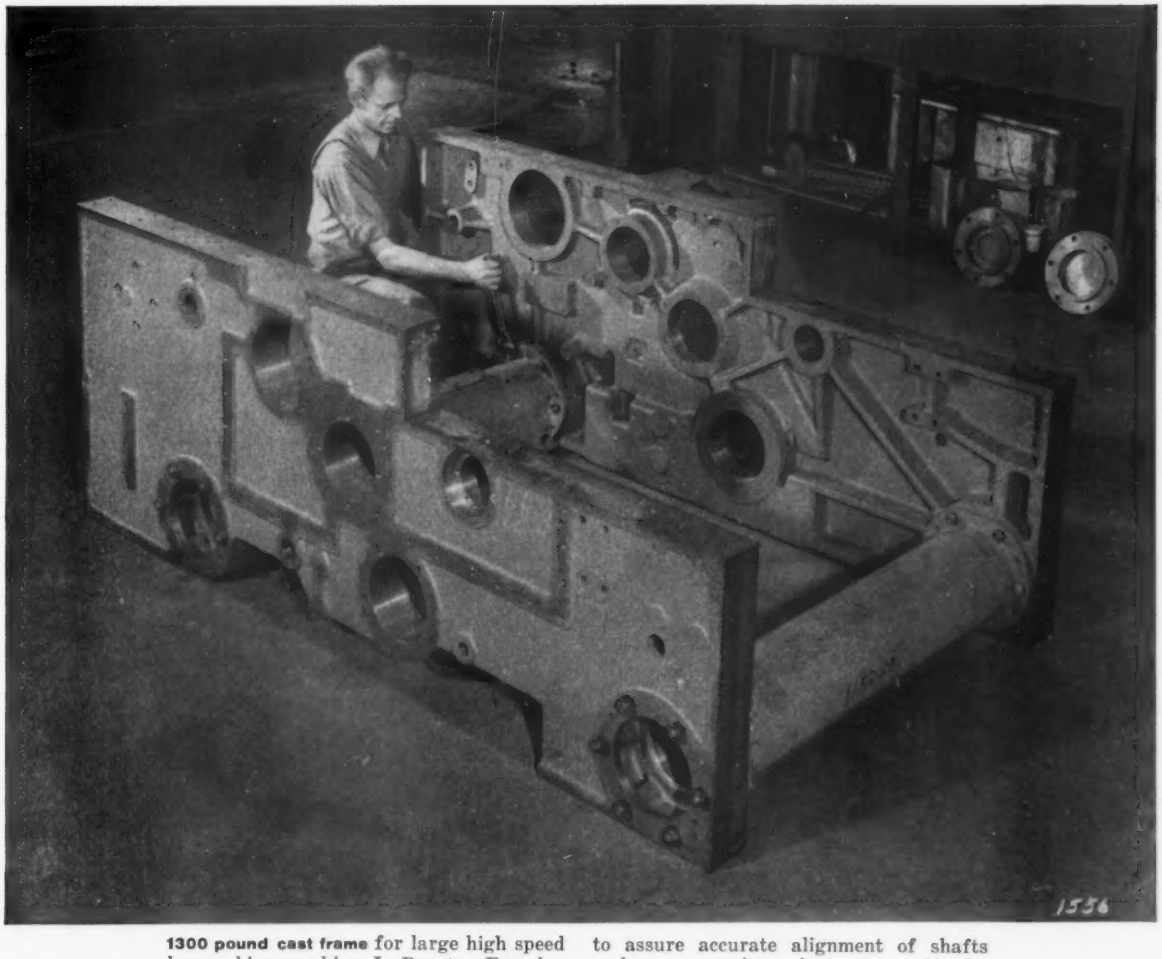
Circle 551 on Page 53



1300 pound cast frame for large high speed bag-making machine. L. Brayton Foundry Co. uses a 1% nickel cast iron for frames to assure accurate alignment of shafts and cross members during assembly by St. Regis Paper Company, East Providence.

How nickel irons help you maintain control of large, complex castings

One of the easiest ways to obtain dimensional stability in a big, intricate casting is to use a nickel cast iron.

Take the matched frame members shown above, for example.

You'll see the problem right away. Unless cored holes and to-be-machined surfaces line up almost perfectly . . . up go machining costs.

Now notice the heavy bosses and ribs. And take note that the supporting web is ½-inch thin. You would expect some chill in this web and a tendency to warp. And you might forecast a costly stress relief or expensive set-up time in machining operations.

L. Brayton Foundry got around all this quite easily. By using a nickel cast iron mix, they were able to deliver these frames "as cast" and meet all requirements for dimensional accuracy.

Nickel irons give you more control over chill...help keep warping stresses low

Nickel cast irons show less tendency to chill. With these irons, structure is more uniform. Build-up of internal warping stresses in large, complex castings is not as high.

What's more, selection of the right grade of nickel iron gives you improved control over structure, and hence, machinability, wear resistance, strength and other properties desired by you and your customers.

Pass on to your customers the benefits of nickel cast irons

Next time you have an order coming up for a large, complex casting, look into the economics of nickel cast irons. You may be able (1) to reduce your own costs or (2) to provide your customer with a much better casting.

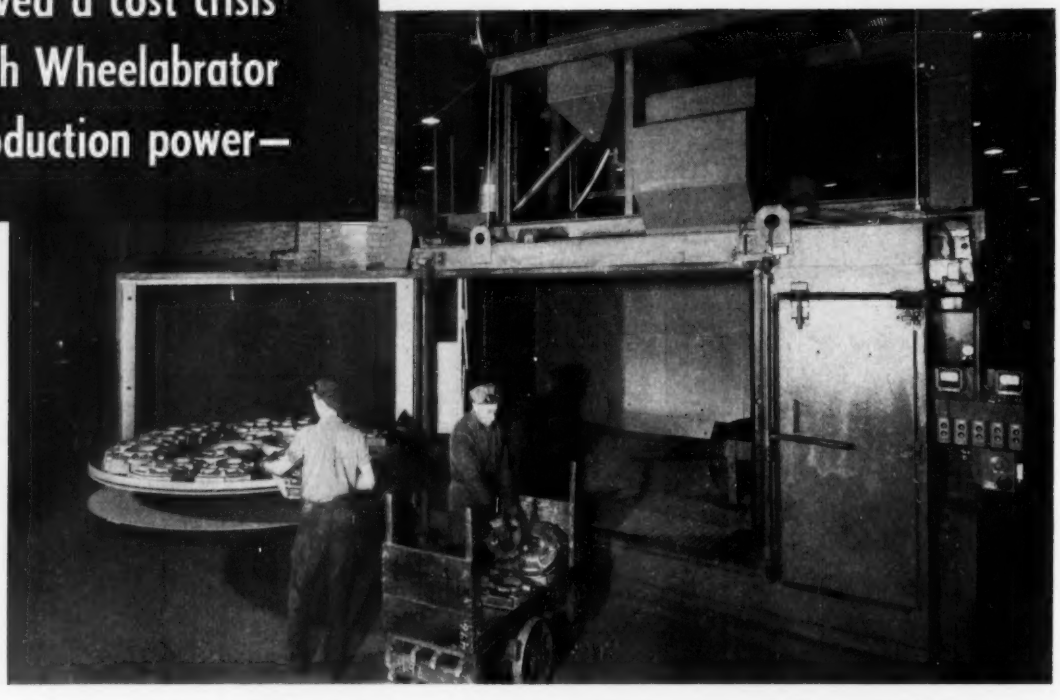
Maybe you can do both. The way to find out is to contact Inco. Inco's engineering service can help you . . . on either a special foundry problem or to help convince a customer.

THE INTERNATIONAL NICKEL CO., INC.
67 Wall Street New York 5, N. Y.

INCO
TRADE MARK

NICKEL CAST IRONS...*best for you because they're best for your customers*

how Dodge Mfg. Corp. solved a cost crisis with Wheelabrator production power—



an open door to cost reduction

This Wheelabrator Swing Table coped with a cost crisis in the cleaning room at Dodge Manufacturing Corp., Mishawaka, Indiana. After having modernized other departments in its large gray iron foundry, this progressive firm faced a combination of problems in its airblast cleaning operations.

Snails-pace airblast room cleaning often delayed production. Even with three operators, cleaning production could not keep pace with other departments. Overtime work was common. And, in spite of the excessive labor costs, airblast cleaning quality did not measure up to the Dodge standards of inspection.

Installation of the Wheelabrator airless abrasive blast cleaning machine, with auxiliary spot air blast facilities, however, turned the problem into profit. The Swing Table easily handles loads weighing up to 10,000 lbs. Easy overhead loading and unloading speeds production, makes work handling highly efficient. Mixed loads can be cleaned at one time, assuring full-time production.

The airblast room, always a dirty, uncomfortable operation, was eliminated, and with it the need to buy a new air compressor. The prodigious production power of the Wheelabrator slashed labor costs, reduced the work force one third, and entirely eliminated overtime. Cleaning quality far superior to anything previously obtained, is achieved in a fraction of the former time. Modernizing for cost reduction with Wheelabrator equipment again has paid off handsomely.

For more information, write for Bulletin 119-D, illustrating cost-saving applications of Swing Table equipment.

WHEELABRATOR
CORPORATION

505 South Byrkit Street **Mishawaka, Indiana**
Canadian Offices: Scarborough (Toronto) — Montreal

WORLD'S LARGEST MANUFACTURERS OF AIRLESS BLAST CLEANING EQUIPMENT AND STEEL ABRASIVES

Circle 554 on Page 53

February 1959
Volume 87—Number 2

FOUNDRY
A PENTON PUBLICATION

This aluminum permanent mold casting is a supporting member for a church pew. It was cast at the B. F. & S. Bronze Foundry Co., Brooklyn, N. Y. (Page 94). Market potential for castings use in furniture manufacturing appears to be growing (Page 138)

Creating the Climate 71

Editorial—By FRANK G. STEINEBACH

Automatic Molding Line 72

At American-Standard Corp., Baltimore, an automatic molding line turns out a 6600-lb poured mold every 45 seconds. The line produces sinks and wash basins. Scrap rate is under 1 per cent—By ROBERT H. HERRMANN

How To Make Incentive Plans Successful 76

To the extent that such a course is practical, management should set standards for each task and should reward each worker on the basis of how well that particular task is performed—By URBAN VON ROSEN

Now They're Casting Photos 78

New process uses conventional photographic methods to produce a master pattern mold from which production wax patterns can be made. These patterns are used to make investment casting molds—By ROBERT H. HERRMANN

Air Gap Limits Chill in Cast Iron Rolls 81

Under sponsorship of the Roll Manufacturers Institute, tests were made to determine effects of the air gap which forms between iron mold and the solidified surface of the casting—By J. D. KELLER and N. R. ARANT

Thickness of Precoat for Investment Castings . 82

Study shows that thickness of investment casting precoat film is a function of viscosity only. It does not depend on composition, aging, drying time, or drying temperatures—By DONALD J. KENNEY and PAUL A. RUTT

Properties of Copper-Base Alloy Castings . . . 86

Here are results of a study on effects of casting section on the properties of 88-10-2, 86-7-5-2, and 85-5-5-5 gunmetals, with and without additions of nickel—By F. HUDSON, D. R. WOOD, and J. F. GREGG

Foundry Uses Sand and Metal Molds 94

Nonferrous foundry expanded its market by building a new foundry to make zinc diecastings and aluminum permanent mold castings, then doubled its sand foundry production with a new sand system—By ROBERT H. HERRMANN

Foundrymen See Upturn in 1959 101

Four out of five foundries say that they expect better business this year. About one-fourth of all foundries expect to make major capital expenditures for plants and equipment during 1959

Producing Small, Precision Parts 102

Precision forming process combines advantages of investment casting with those of such methods as coining or cold forming—By J. H. CADIEUX

CONTINUED NEXT PAGE

Editor: FRANK G. STEINEBACH
Managing Editor: WILLIAM G. GUDE
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Associate Editors: ROBERT H. HERRMANN, JACK C. MISKE
Assistant Editors: VIRGINIA C. TAYLOR, VIRGINIA B. HARMS
Art Editor: DON S. CADOT

CONTINUED FROM PAGE 3

Obtaining Facts on Casting Corrosion 118

ASTM is making first accurate measurement of malleable iron's long-term corrosion resistance at a number of exposure sites—By JAMES H. LANSING

Molding Line Features Automatic Handling . . 128

Molding line for small automotive parts includes automatic sand handling and distribution, automatic shakeout, and automatic casting cooling

Man to Man 134

Don't spend your time worrying about the inevitable things in life. Devote yourself to constructive effort, instead—By RALPH L. LEE

Cast Aluminum Chairs 138

Chairs cast in aluminum for the new Air Force Academy strike a new note in furniture design and manufacture, may offer new casting market

Designing an Automatic Diecasting Machine . . 148

Automatic diecasting machine for small parts produces better castings by eliminating process variables—By IRWIN LUBALIN

Electric Furnace Conference 166

By EDWIN BREMER

The Sandman Says 173

Benvenuto Cellini lost his set of pewter dishes and nearly burned down his foundry when he poured his famous Perseus—By HAROLD E. HENDERSON

International Foundry Congress Reports 184

Here are the concluding resumes of technical papers presented at the 1958 International Foundry Congress in Belgium—By M. M. HALLETT

In Every Issue

Around the Country	194	Literature for Foundrymen	142
Calendar of Meetings	16	Men of Industry	154
Equipment and Supplies	105	News Views	141
Foundry Developments	132	Obituary	171
How To Do It	126	Questions and Answers	98
Industry Briefs	124	The Shakeout	198
Late News	33	With the Editors	10

Classified Advertising—204 Advertisers' Index—213 Business Staff—213

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FOUNDRY is edited primarily for management, production, technical, and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve all key foundry personnel on a personal or routed basis. A limited number of copies is supplied at no cost to educational institutions. Subscriptions in the U. S., possessions, and Canada for home-addressed copies and copies not qualified for under the above principles: One year, $10. Single copy, $1. Other countries: One year, $20. Single copy, $2. Published monthly and copyright 1959 by The Penton Publishing Co., Penton Building, Cleveland 13, Ohio. Accepted as controlled circulation publication at Cleveland, Ohio.

THE EDITORS' WORKSHOP

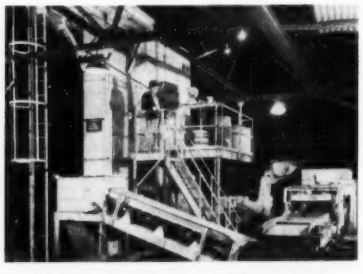
NEW PROCESS—It's a far cry from the patternmaker's normal practice, but the manner in which the pattern was made for this cast reproduction of a bridal party scene

is one of the most interesting new developments in the investment casting industry.

Associate editor Bob Herrmann, who describes it in this issue (Page 78), had a hand in coining the word "Photocast" which is used as the name of both the process and the company which is promoting it.

IN THE WORKS—Here are a few articles you can expect to see in coming issues: "Advancements in the CO_2 Process" by Waldemar Schumacher of Germany; "The Relationship of Test Bar to Casting Properties" by W. J. Reichenecker, Westinghouse Electric Corp., and "Sand and Related Facts" by Hubert Chappie, National Supply Co.

MODERNIZATION—How the small and medium-sized jobbing foundry can modernize its production methods on a gradual basis will be detailed in a comprehensive



article next month. Author Henry Zimnawoda, National Engineering Co., makes liberal use of illustrations to help explain the step-by-step procedure.

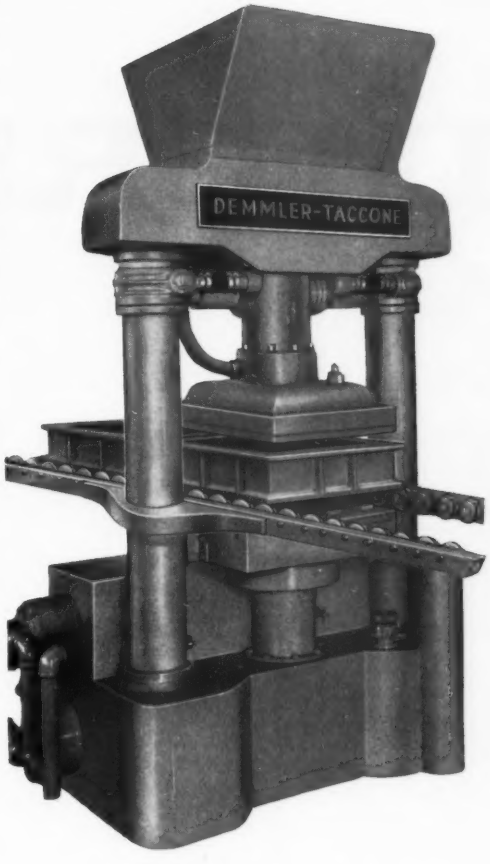
ANNOUNCEMENT

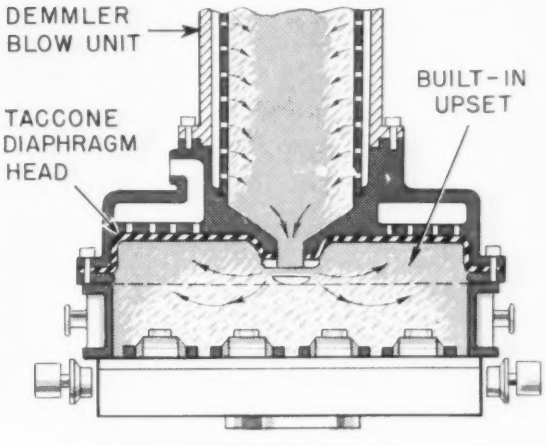
THE

DEMMLER-TACCONE

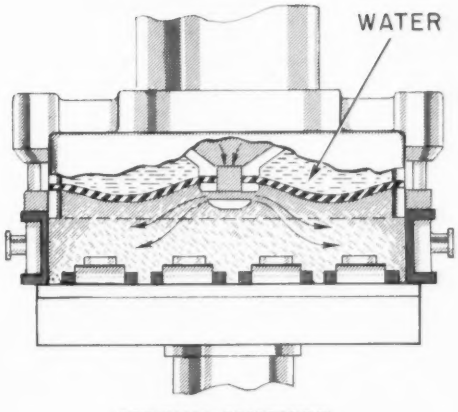
BLOW FILL—DIAPHRAGM SQUEEZE MOLDING MACHINE

We are pleased to announce the introduction of another fine molding machine for the Foundry Industry. After considerable developmental work the Taccone patented Flexible Diaphragm has been successfully combined with the Shoot principle for flask filling engineered by Demmler Manufacturing Company.

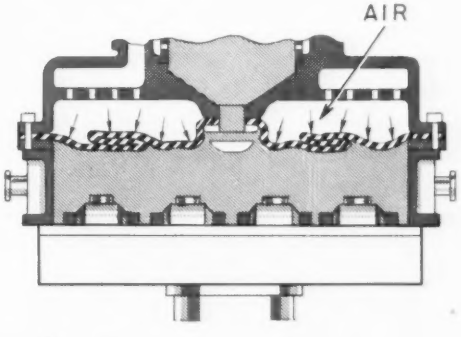




1. **BLOW-FLASK FILLER**
Shoot Principle by Demmler



OPTIONAL EQUIPMENT
Compression Head
Liquid Filled Diaphragm



2. **SQUEEZE**
Taccone Patented Diaphragm Principle

FOR FURTHER INFORMATION PHONE OR WRITE

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KEWANEE, ILL.

EASTERN CLAY PRODUCTS Dept.
INTERNATIONAL MINERALS & CHEMICAL CORP.
(Sales agents for Taccone foundry equipment)
OLD ORCHARD RD., SKOKIE, ILL.

Circle 555 on Page 53

Sure, I've been running this core room since you were in knee britches. But my boss doesn't hire whiskers; he wants performance—the right cores for the job. And the work here varies all over the lot. I stay right up to date on binders, processes and brands, so—

don't call me an

OLD TIMER!

We're using all three, aren't we?

LINOIL...for oil-sand cores
LIN-O-SET...for air setting
ADCOSIL...for CO_2 gas curing

This is a jobbing foundry. We sell custom castings at a profit—some involve intricate high production core work; others call for massive chunk cores. Our production dictates what cores are needed, and it's up to me to have the right cores on the floor at the right time.

That means flexibility, and in our case, three processes: conventional, air setting, and CO_2.

Back when I was an apprentice core maker, LINOIL was the oil we depended on. I still count on LINOIL for our baked cores because I get consistent quality and uniformity—cores are strong and hard and they shake out like sugar. I can make a selection from a wide range of LINOILS for any type job.

LIN-O-SET came along just in time to save us time and money in the fabrication of large cores. Our chunk cores now take half as much time to make and a third less time to bake. Helps offset increased costs. Cuts rodding and cleaning in half, too!

ADCOSIL, ADM's CO_2 core binder, works like magic to cure intricate cores instantly and thoroughly. Ideal for blown cores. ADCOSIL with color indicator tells us where to place core vents and helps us rig new boxes and patterns.

I'm no OLD TIMER... We're up to date, boy! We buy ADM-Federal core binders for any and all processes! What's more, we buy smart... always order mixed truckloads and get lowest price, as well as reducing our freight costs.

.... Archer-Daniels-Midland company

FEDERAL FOUNDRY SUPPLY DIVISION

2191 West 110th Street • Cleveland 2, Ohio

Circle 556 on Page 53

Have you heard about the

power center for

New A. O. Smith d-c Multiple-Operator unit makes it possible for many operators to weld from one power source with "at the arc" heat control — regardless of how far they're located from the power source! And this single power source can be housed in a dirt-free area — *drastically reduces maintenance costs!*

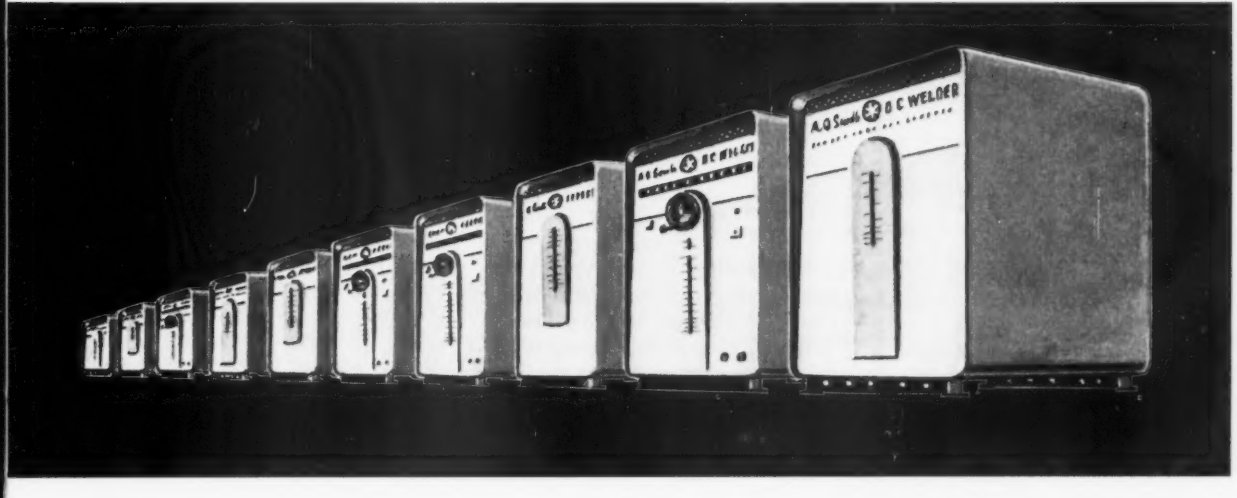
The A. O. Smith 1500-amp, d-c Multiple-Operator machine, at left, is one of three available "MO" units. Others are rated at 500 and 750 amps. These machines are specifically designed to replace or augment existing m-g sets or single-operator transformer welding machines. They are particularly adaptable to foundry work because they allow operation of many arcs (through grids) . . . can be located away from trouble-causing dust, sand and other elements.

The illustrated Model A15000MO is a 1500-amp machine with a 100% duty cycle rating . . . offering 80 open circuit volts, 95% efficiency . . . compact, ageless silicon rectifiers and a 97% power factor correction.

foundry welding?

A. O. Smith's Multiple-Operator unit is a d-c, constant potential type power source which provides upwards of 1500 amperes of d-c current from a single unit. Individual operator requirements are provided by means of series resistance grids which offer "at the site" amperage selections. For example: Model A15000 is a 1500 ampere unit which can be housed in a dirt-free area or room. A single cable from the power source to a terminal block near the welders' stations distributes current to the individual welding stations where it is drawn off by means of the individual operator's grid.

This A. O. Smith method minimizes equipment investment . . . holds maintenance and standby engineering costs to an absolute minimum. Further, it plays an important part in stabilizing power factor requirements . . . saves substantial sums on costs by equalizing power demands — even during peak welding periods.



A. O. Smith also offers a complete line of d-c machines —either selenium or silicon rectifier types, designed and built to provide long-lasting, trouble-free performance. Machine range from 200 to 2500 amperes. For more details on the multiple-operator machines, d-c rectifiers, or complete line of a-c transformers, contact your "man from A. O. Smith" or write direct.

Through research ... *a better way*

A.O.Smith
CORPORATION
WELDING PRODUCTS DIVISION
Milwaukee 1, Wisconsin

A. O. Smith International S. A., Milwaukee 1, Wisconsin, U.S.A.

Circle 557 on Page 53

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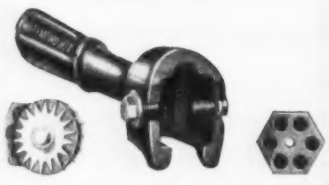
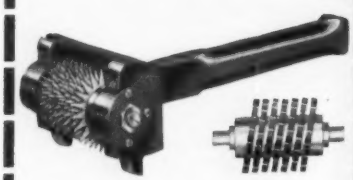


LIVES FOR FOUNDRY GRINDING WHEEL



DRESSERS

Cut grinding and snagging costs with inexpensive Desmond Hex dressers. They bring grinding wheel faces to "new" efficiency by removing loaded metal and exposing sharp abrasive grains. And Hex dressers provide six sets of bearings in one set of bearing blocks . . . for extra life on average wheels. For resinoid and rubber bonded high-speed wheels use the ball-bearing Desmond Heavy Duty Dresser. Ask your Desmond distributor's advice.

Desmond

Desmond-Stephan Mfg. Co.
Urbana, Ohio

Circle 558 on Page 53

With the Editors

● **IN JAPAN:** Last fall a Japanese Small Business Foundry Layout Specialists Study Team visited this country under the auspices of the International Co-operation Administration, Washington. During their tour they spent an afternoon at the offices of FOUNDRY in Cleveland where they asked many questions of the editors.

Numerous study teams have visited us and the experiences have been interesting and rewarding. But this visit was just a little different because the team gave us a card carrying reproductions of photographs of each team member, and a beautifully prepared 26-page booklet entitled "Foundry in Japan . . . on Small and Medium Scale."

The booklet states there are 1900 small and medium-sized foundry plants in Japan. Fundamental problems which have confronted Japanese foundries since the war are listed as follows: 1—Excessive manpower and poor productivity; 2—Lack of stability in demand and supply; 3—Destruction caused by war and conflict between old and new ways of thinking; 4—Conflict between the idea of free competition and capital monopoly.

The booklet illustrates and outlines the equipment used in foundries having 100 and 300 employees and describes briefly the operation.

—o—

Still Serving: A new type of contest recently was conducted by the Harry W. Dietert Co. of Detroit. A new universal sand strength machine was offered as the prize for the company owning and using the oldest strength machine produced by that firm.

Jess Toth, sales manager of the Dietert company, reports that the winner is Clio Foundry Inc., Clio, Mich., which has a machine purchased in 1928 and now in use eight times each day. Other companies reporting old machines in daily use are as follows: Sall Bros. Co., purchased in 1928; Blaw-Knox Co., 1928; Galva Foundry Co., 1928; Chicago Malleable Castings Co., 1929; Detroit Stoker Co., 1930; Battelle Memorial Institute, 1930. The Chevrolet-Saginaw Grey Iron Div. of General Motors Corp., has a machine purchased in 1931 which is used 340 times daily.

—o—

Unique: An unusual Christmas tree adorned the lobby of Monarch Aluminum Mfg. Co., Cleveland, during the holiday season. As shown

in the accompanying illustration, the 8-foot, 300 lb tree was made from aluminum bar stock and decorated with 48 different die and permanent mold castings produced by the company for various customers.

Castings included numerous parts for home workshop items, housing and operating mechanisms for lawn mowers; components for industrial, office, and restaurant equipment; parts for highway bridges and automobiles; nose cones for shells used by the military; waffle grids; sole plates for electric irons; fruit juicer parts; washing machine agitators, and vacuum cleaner parts. Cooking utensils, porcelainized in turquoise, red, yellow, pink, and blue, added color. The tree was conceived by Monarch foremen Gene Klepec and Fred Stroh.

—o—

Dermatitis: An editorial in the Nov. 20 issue of our worthy contemporary, *Foundry Trade Journal*, which discusses a British industrial health report, has the following interesting paragraph:

"In this Report, a special chapter is given over to dermatitis, because the chief inspector rightly considers

insure sharp, true-to-pattern mold surfaces with

GRUNDITE BOND CLAY

Goose Lake GRUNDITE Bond Clay, composed of "illite," provides the ideal bond for low-clay content, high permeability, low dry strength foundry molding sands. GRUNDITE bonded sands are not "sticky," will screen readily and flow freely from bins and hoppers. Additions of GRUNDITE provide a quick increase in the green strength . . . assures accurate mold surfaces with quick, easy shake out . . . provides lump free, easily reconditioned sands. GRUNDITE BOND is extremely durable and will maintain uniform sand strength for long periods with only small additions. Many malleable foundries have cut "pin hole" porosity by 94% using GRUNDITE Bond.

Write today for complete information.

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Main Office—Barber Building, Joliet, Illinois
Sales Office—208 South LaSalle Street, Chicago 4, Illinois

MANUFACTURERS OF: GOOSE LAKE Ladle Brick, Ground Fire Clay, Fire Clay Flour; GRUNDITE Bond Clay; FIROX; THERM-O-FLAKE Insulation Coating, Brick, L.B. Block, Concrete; CHEM-BRIX, Silica, Carbon

Circle 559 on Page 53

To cut costs with conveyors

Ask Standard

Starting at the molding machines, a complete Standard conveyor system, with transfer cars, is used to move flasks and molds to pouring and storage area, with return lines for empty flasks.

Step up core making production with low-cost roller conveyors

Foundries are finding new savings in production with Standard's low-cost gravity conveyors. One user of national repute states these conveyors have "worked out just fine" for making and handling cores, before and through the oven.

Heavy-duty Standard foundry roller conveyors equipped with shielded bearings make possible smooth, efficient handling of molds and flasks.

Standard offers specialized experience of more than 50 years of designing and building foundry and mill conveyors. For any conveyor need, contact STANDARD CONVEYOR COMPANY, General Offices: North St. Paul 9, Minnesota.

Left: simple, low-cost Standard gravity conveyors speed core making and handling, before and through oven. *Right:* roller conveyors carry molds to the pouring floor.

Send for Standard's special catalog — a valuable reference book illustrating and describing various conveyor installations in leading foundries. Ask for Bulletin 68 — address Dept. N-2.

Standard GRAVITY & POWER CONVEYORS

OVER 50 years of conveyor experience

Sales and Service in Principal Cities

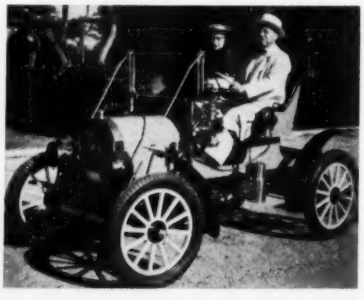
this to be important. From June 7, 1954 to June 4, 1955, there were 17,400 spells of certified incapacity for employment for males and 4,900 for females owing to this cause; the estimated average duration of a spell of incapacity being 41 days for males and 48 days for females, with a total of 930,000 days lost in the period under review.

"In the traditional processes of the manufacture of castings, there was little fear of dermatitis, but there would appear to be risk with some of the more recent methods, both of moulding and patternmaking. The Report gives (in five paragraphs) advice as to how the incidence of this ailment can be prevented. The second paragraph, 'selection of personnel,' which takes up over six lines, could from the practical point of view be summed up by stating 'beware of blondes and redheads,' as nature has made this class more susceptible to dermatitis. The recommendations set out are sensible and should be meticulously followed."

—o—

In a Bunch: Thanks to our friends who sent so many interesting and beautiful cards to FOUNDRY and its editors at the holiday season.

Knowing that Harry W. Dietert,



Harry W. Dietert Co., has become quite an enthusiast on restoring automobiles of ancient vintage, I was not surprised when his card included the photograph reproduced in this column. It shows the Dieterts—Alma and Harry—ready for a spin in a 1911 Brush. Sorry that we could not reproduce it in the brilliant colors of the original.

A card from Genevieve and Ralph Teetor, Cadillac, Mich., stated that the Dieterts and Teetors would leave Jan. 10 on the *Kungsholm* for three months in the South Pacific and the Orient. F.G.S.

interchangeable with all standard JIC cylinders

With the introduction of the ALL NEW T-J Squair Head, Tomkins-Johnson now offers industry the most complete design range of air and hydraulic cylinders. Presently available in bore diameters from 1½ to 8 inches, the T-J Squair Head is an interchangeable cylinder which produces maximum force and efficiency, with minimum pressures ... and is also adaptable to the use of low pressure oil as the working medium. Write to The Tomkins-Johnson Co., Jackson, Michigan, for Bulletin #SQ 10-58 and complete details.

CHECK THESE 10 POINTS OF T-J SUPERIORITY

1 One Piece Piston

2 Hard Chrome Cylinder Bore and Piston Rods

3 High Tensile Steel Tie-Rods

4 Cushion Adjusting Screw, Externally Adjustable

5 New Super-Cushion for air, or Self-Aligning Master Seal for Oil (T-J Patents)

6 Solid Steel Heads and Mounting Plates Standard all Models

7 Port Design Allows Minimum Pressure Drop on Inlet or Outlet

8 Chevron Type, Self-Adjusting Rod Packing

9 Piloted Packing Gland–Absolute Alignment

10 Piston Rod, Extra Strong–Polished and Chrome Plated for Efficiency and Protection

T-J TOMKINS-JOHNSON

RIVETORS... AIR AND HYDRAULIC CYLINDERS ... CUTTERS... CLINCHERS

Circle 561 on Page 53

International Minerals & Chemicals

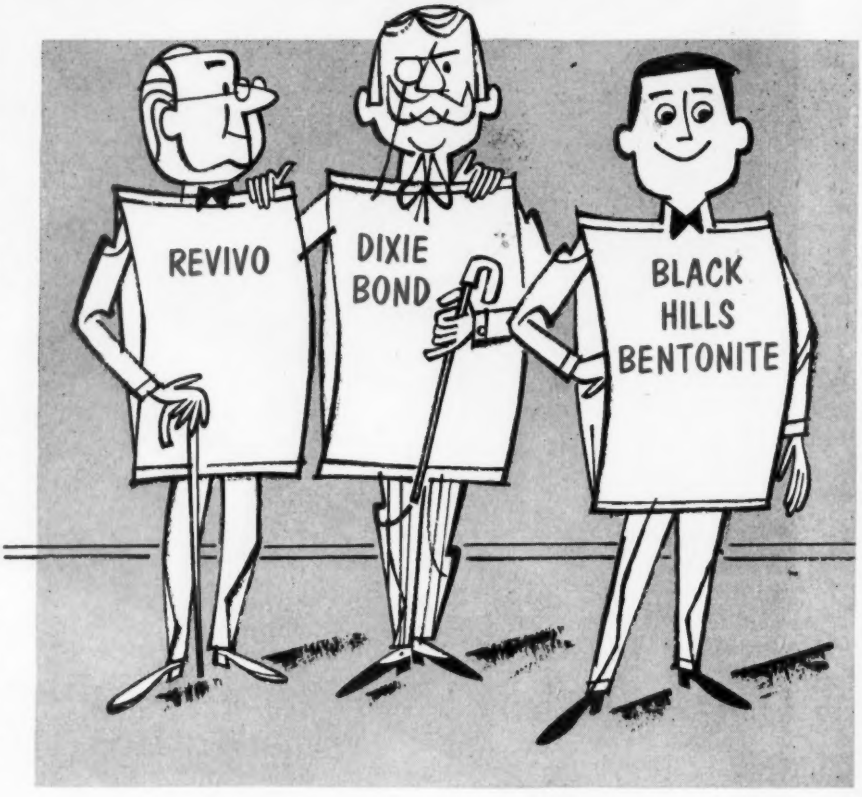
A REPORT TO FOUNDRIES

FROM TOM BARLOW

The trend in molding:

accentuate the additives

In green sand molding, progress is more apt to be a matter of evolution than revolution. Changes have been so gradual that we sometimes fail to notice how drastic a difference the last thirty years have made. Did you ever meet and old schoolmate after twenty years and notice how much *he* had changed? In the same way, a Rip Van Winkle of molding would be startled by what he would see today — The Age of Additives.



Age of Natural Sand

Sand practice has come through at least three distinct phases — with minor but important growths within each period. By-passing ancient history, we can start with the Age of Natural Sand. During this time, the only molding sands were mixtures of sand, clay, silt and miscellany as they occurred in nature. These sands are still used and probably always will be for special applications and/or shops without adequate sand conditioning equipment. They were easy to control because there was nothing *to* control — other than the source from which you bought them.

Age of Synthetic Sand

The introduction of Revivo (to revive worn-out sand) by ECP was a pioneering move toward the Age of Synthetic Sand. At first, the bonding clays were added to used natural sand (today we call these semi-synthetic). Later foundries started with clean sand and added sea-coal, pitch, etc. Western Bentonite produced somewhat different properties and advanced a little farther from the parent natural-sand values. Lower moisture, high toughness and more permeability became the order of the day. Soon N. J. Dunbeck (of Eastern Clay Products) introduced and patented the use of southern bentonite (known then and now as Dixie Bond). More flowability and permeability with lower hot and dry strengths opened up new possibilities. Today, foundrymen recognize that no one clay can be best for every application. To be impartial in our service and sales work, we produce all three (and some combinations, such as Balanced Revivo).

Now—the Age of Additives

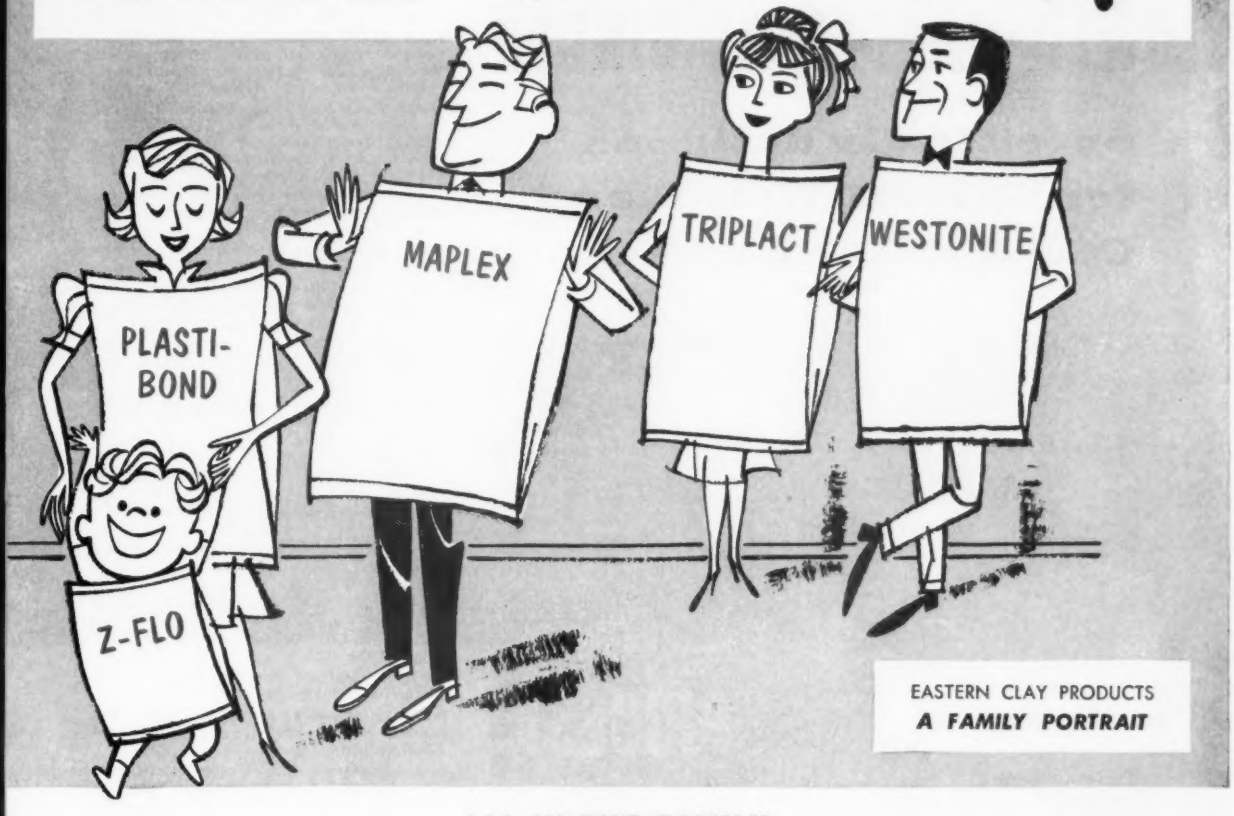
We now approach the Age of Additives which probably dates back to ECP's introduction of Westonite, the original waterless molding sand. The purpose of this program was to combine flowability, toughness and strength in the same sand. This cannot be done by clay alone! When synthetic sand was young, many people thought only in terms of one clay—only one way to skin the cat. They now know there are many — each with its own virtues. For example, Dixie Bond is not a direct substitute for Black Hills Bentonite and vice versa. The same philosophy is true of flowability additives. No one can do all jobs equally well. They vary considerably in their effect on green strength, hot strength, dry strength and impact strength.

NEW CHIP OFF THE OLD FAMILY TREE

Have a cigar! There's a new addition to the line of Eastern Clay additives — Z-Flo. Following is a word picture of the type of foundry that might profitably adopt the baby. If one or more of these shoes fit you, why don't we discuss it in person — in detail.

DO YOU . . .

- Require a versatile sand?
- Use a slurry system of clay addition?
- Have trouble with cuts and washes?
- Want a sand that isn't waterproof?
- Require a high-durability additive?
- Lack adequate mulling time or equipment?
- Use either natural or synthetic sand?
- Have trouble with deep pockets?
- Have broken molds from rough handling?
- Use too many facing sands?
- Want to use more Dixie to reduce costs and still want good dry strength and toughness?



EASTERN CLAY PRODUCTS
A FAMILY PORTRAIT

In this Age of Additives, there's a *best* additive for what *you* do. We have the entire range to work with and the know-how to make impartial and accurate recommendations. Our research, experience and desire to serve may help you make more money through better castings.

ALL IN THE FAMILY

Here's a picture of molding progress through the last 20 years. Westonite triggered the Age of Additives. Today — in addition to Maplex (pure hard maple flour) — we insist on producing three distinct grades of additives for better finish, better peel, better casting tolerance and reduced casting defects. In future columns, we will clarify the differences between them, based on both research data and operating experiences. You will have the chance to determine for yourself what member of the Eastern Clay Products family is of greatest interest to you. Don't miss the next exciting episode in the lives of the additive family. The cast includes: TRIPLACT, the oldest; PLASTI-BOND, the most popular; Z-FLO, baby of the family.

MINERALS International CHEMICALS

Creators of
Living Minerals

EASTERN CLAY PRODUCTS DEPT.

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

Administrative Center, Old Orchard Road, Skokie, Illinois • ORchard 6-3000

1-59

Circle 562 on Page 53

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NEW STEINEX

SLOWER-HARDENING BINDER

Specifically designed for BENCH WORK and CORE BLOWER use

CarVer FOUNDRY PRODUCTS
Muscatine, Iowa

Please rush information and prices on
New Steinex binder ☐
Krauss Core Vents ☐

NAME _____ TITLE _____

FOUNDRY _____

CITY _____ STATE _____

CALENDAR of Meetings

Feb. 2-6—American Society for Testing Materials, Committee Week, Penn-Sheraton Hotel, Pittsburgh.

Feb. 12-13—Wisconsin Regional Foundry Conference, Schroeder Hotel, Milwaukee.

Feb. 15-19—American Institute of Mining, Metallurgical, & Petroleum Engineers, annual meeting, San Francisco.

Feb. 18-19—Malleable Founders' Society, Technical and Operating Conference, Wade Park Manor Hotel, Cleveland.

Feb. 26-27—Southeastern Regional Foundry Conference, Hotel Tutwiler, Birmingham.

March 9-10—Steel Founders' Society of America, annual meeting, Drake Hotel, Chicago.

March 13-14—California Regional Foundry Conference, Huntington Hotel, Pasadena, Calif.

March 16-20—American Society for Metals, plus other technical groups, Western Metal Exposition and Congress, Pan-Pacific Auditorium and Ambassador Hotel, Los Angeles.

March 17-19—Investment Casting Institute, technical session, Santa Monica, Calif.

March 17-19—National Association of Corrosion Engineers, annual show and conference, Sherman Hotel, Chicago.

March 18-19—Foundry Educational Foundation, annual College-Industry Conference, Statler-Hilton Hotel, Cleveland.

March 19-20—Texas Regional Foundry Conference, Menger Hotel, San Antonio, Tex.

April 8-9—Malleable Founders' Society, Market Development Conference, Sheraton-Cleveland Hotel, Cleveland.

April 13-17—AFS Castings Congress & Engineered Castings Show, Hotels Sherman and Morrison, Chicago.

April 16—Foundry Section, Magnesium Association, sectional meeting, Congress Hotel, Chicago.

May 13-15—National Industrial Sand Association, annual meeting, Homestead, Hot Springs, Va.

May 25-26—Malleable Founders' Society, annual meeting, Homestead, Hot Springs, Va.

May 25-27—American Society for Quality Control, annual convention, Public Hall, Cleveland.

May 25-28—Design Engineering Show, sponsored by machine design division, American Society of Mechanical Engineers, Convention Hall, Philadelphia.

June 9-12—Material Handling Institute, 1959 Exposition, Public Hall, Cleveland.

June 21-26—American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

June 25-27—Penn State Foundry Conference, Pennsylvania State University, University Park, Pa.

Sept. 21-22—Steel Founders' Society of America, fall meeting, Homestead, Hot Springs, Va.

Sept. 21-25—Instrument Society of America, annual Instrument-Automation Conference and Exhibit, International Amphitheatre, Chicago.

Sept. 24-25—Missouri Valley Regional Foundry Conference, Missouri School of Mines & Metallurgy, Rolla, Mo.

Oct. 4-10 — International Foundry Congress, organized by Spanish Institute of Iron & Steel, Madrid, Spain.

Oct. 7-9—Gray Iron Founders' Society, annual meeting, Fairmont Hotel, San Francisco.

Oct. 10-13 — Conveyor Equipment Manufacturers Association, annual meeting, Grand Hotel, Point Clear, Ala.

Oct. 15-17—Foundry Equipment Manufacturers Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Nov. 16-20—International Automation Congress & Exposition, New York Trade Show Building, New York.

Circle 563 on Page 53

Greatest get-up-and-go...

Of all fork lift trucks, *this Towmotor Pace-Maker has it!* Mass-handling miracles seem to happen every minute it's on the job. Its hydraulic muscles hustle heavy loads through storage, production and shipping with a real promise of extra profits *around the calendar.*

Let us send you latest on-the-job facts applying to your specific type of factory, mill or warehouse operation. Ask for Certified Job Studies relating to your own business—and the new *Pace-Maker* Booklet SP-23. Write *Towmotor Corporation, Cleveland 10, Ohio.*

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THE ONE-MAN-GANG
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Gerlinger Carrier Co. is a subsidiary of Towmotor Corporation

Circle 564 on Page 53

Ultimately, *somebody* has to get rid of "plant" dust, dirt, smoke and fumes. If the job is left up to workers or neighbors the cost to management is exorbitant. Worker morale and efficiency drops, neighborhood relations deteriorate and plant cleaning costs continually climb.

The modern (and thrifty) way to attack the problem is with AAF Dust Control applied at all dust sources. This way, dust is trapped the instant it is produced. It never has a chance to irritate workers, arouse neighborhood housewives or run up your own plant cleaning costs.

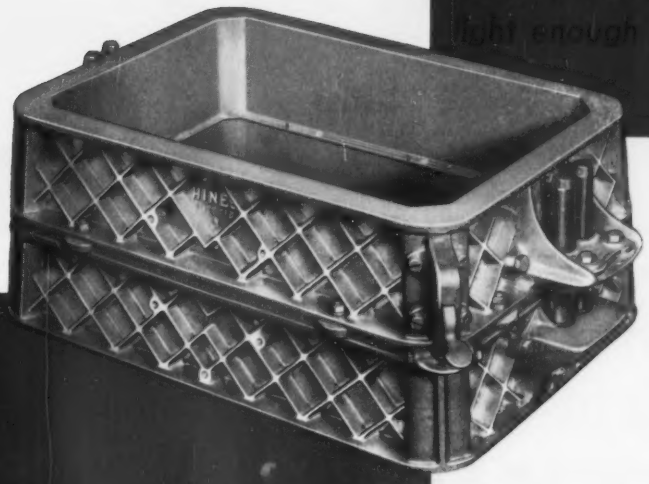
For complete information on AAF's complete line of dust control equipment, write for "The Answers to the Five Basic Dust Problems" (Bulletin 270-A1). Address: Mr. Robert Moore, American Air Filter Company, Inc., 266 Central Ave., Louisville 8, Kentucky. In Canada: American Air Filter of Canada Ltd., 400 Stinson Blvd., Montreal 9.

AAF **American Air Filter**
BETTER AIR IS OUR BUSINESS

Circle 565 on Page 53

HINES all-purpose SLIP FLASKS

Exceptionally accurate and well-built flasks, for use with natural bond sand — sturdy enough for production jobs, yet light enough to handle on the bench



- Ideal for match plate work and light cope and drag patterns on squeeze machines with pistons up to 14″.
- These high-quality, lightweight flasks have no equal for efficiency, speed and low upkeep.
- Equipped with self-locking sand strips, operated by two throw-out levers.
- Lengths and widths, from 10″ to 24″. Depths from 7″ to 12″. Single or double, round, hex or "V" pins, bushings or guides — or pads for your own pins.

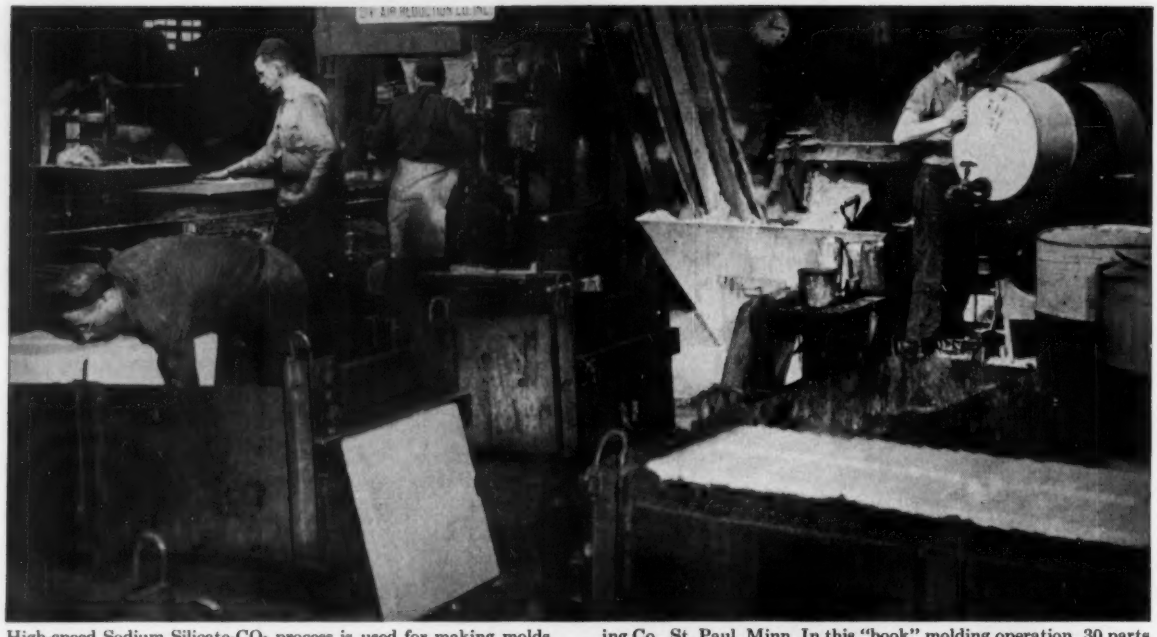
WRITE FOR CATALOG FOLDER NO. 210

THE HINES FLASK CO.

3431 WEST 140th STREET • CLEVELAND 11, OHIO

HINES FLASKS

Circle 566 on Page 53



High-speed Sodium Silicate-CO_2 process is used for making molds for hangar-door counterweights at St. Paul Foundry and Manufacturing Co., St. Paul, Minn. In this "book" molding operation, 30 parts are made with one pour in clamping jacket (*above right*).

These 4 men make 680 rigid, accurate molds in 6 hours with the

SODIUM SILICATE-CO_2 process

Greatly increased production of grey iron castings at the St. Paul Foundry and Manufacturing Co. is credited to the sodium silicate-CO_2 process. The binder used is Archer-Daniels-Midland's "Adcosil," based on Du Pont Sodium Silicate; CO_2 is the curing agent.

Curing takes so little time that 4 men turn out 680 accurate molds in 6 hours for 20 tons of poured metal! Other processes—like green-sand molding—require up to 12 men, yet still can't match CO_2 output. St. Paul Foundry workers prefer CO_2 molding because there are no objectionable fumes. Management likes the extremely close tolerances of the molds—possible because the sand hardens while in *direct contact with the pattern.*

Perhaps your operation can profit with the sodium silicate-CO_2 process, just as the St. Paul Foundry does. Ask your foundry supplier for full details about this timesaving process, or write to Du Pont for names of suppliers of binders based on Du Pont sodium silicate.

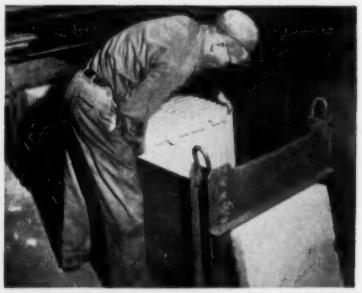
E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Dept., Rm. N-2533, Wilmington 98, Delaware.

DU PONT REG. U.S. PAT. OFF **SODIUM SILICATE**

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

CORE BLOWER forces sand into pattern mold, forming an exact duplicate. St. Paul uses mixture of sand and "Adcosil," a binder made by Archer-Daniels-Midland, Cleveland, Ohio.

HARDENED IN SECONDS—12-second CO_2 gassing reacts with sodium silicate to harden mold while still in pattern. Cured mold won't crack when lifted, is rigid enough to stand on edge without damage.



NO COSTLY SET-UP EQUIPMENT—Molds are placed in clamping jacket for metal pouring. Castings cool overnight. Next morning "books" are shaken out, and jackets made ready for next pouring.

BT TURNOVER

* PRESS-BUTTON OPERATION
* FAST PRODUCTION
* AUTOMATIC MOLD REMOVAL

TECHNICAL REPRESENTATION, SERVICE AND ALL SPARES NOW AVAILABLE IN U.S.A. AND CANADA

write today

for full particulars of these and other models

BRITISH MOULDING MACHINE CO LTD
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P2316

The Norton Measure of Value . . . the true measure of savings on materials you buy for your production is the cost-per-piece produced.

Call your Norton Man — he has the experience, the products, and knows how to save you money where it counts. There's a Norton expert in the fields of — abrasives . . . grinding machines . . . refractories.

You can produce greater savings than you can buy

The economic truth of the above statement applies to all manufacturing and is especially true in grinding wheels.

There are less expensive grinding wheels than Norton wheels — and on the invoice they may look like a bargain. But if the wheels purchased fail to perform efficiently on the production line or incur production delays because of poor quality or misapplication — a higher cost of production is the price actually paid.

In brief, *the true measure of grinding wheel value is not how much you paid for it — but how much you get from it. Here is what you can get from Norton —*

Norton Company gives you the most advanced research engineering and manufacturing facilities in the entire abrasive field — and you get this great scope of detailed knowledge on a personal basis — your Norton Man.

Your Norton Man starts his career by spending a minimum of 1 year in a carefully planned training course in the Norton plant and a comparable period of training in the field. The Norton Man has an average of 15 years abrasive experience in addition to the specialized training. He is the most knowledgeable man in abrasives that you can consult. He is your consulting abrasive engineer.

He will make a free Abrasive Requirement Study for you. This study lists the correct specifications for each abrasive job in your plant to assure you lowest cost-per-piece produced. He is also available for complete field testing on specific problems.

For example, your Norton Man can increase production by pointing out ways to better wheel usage and fewer wheel changes. He has the widest selection of grinding wheels in the industry to help him select the perfect wheel for new product grinding operations and improving your current grinding jobs — both at the lowest cost. And with Norton grinding wheels you can be sure of precise duplication order after order.

Norton offers true abrasive economy. Economy that pays off in lower cost-per-piece produced. Call your Norton Man. NORTON COMPANY, General Offices, Worcester 6, Massachusetts.

W-1891

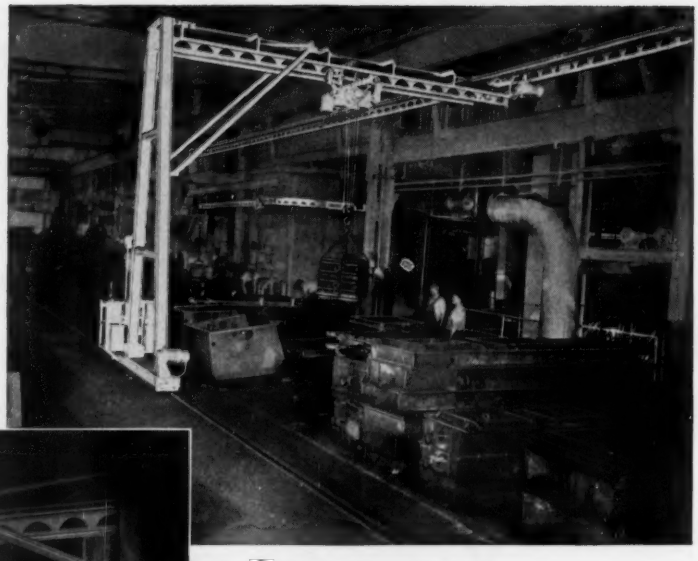
NORTON

ABRASIVES

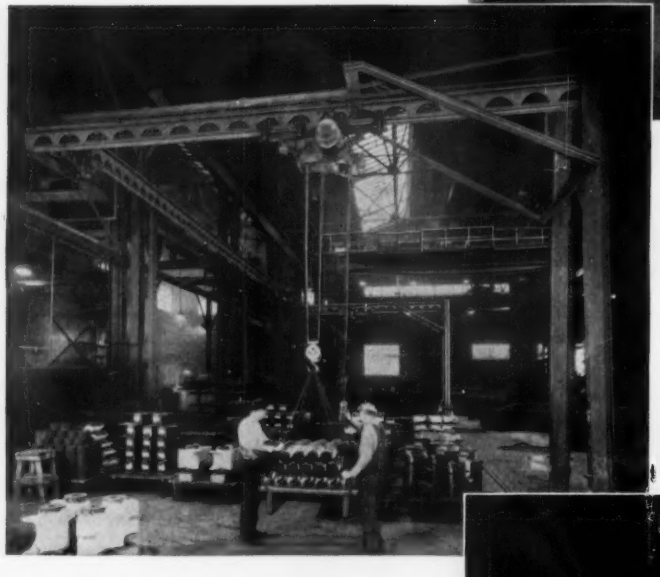
MAKING BETTER PRODUCTS TO MAKE YOUR PRODUCTS BETTER

Circle 569 on Page 53

Gantry Cranes Save Foundries Time and Money



This completely motorized Tramrail gantry crane handles molds to the shakeout. It works under heavy overhead cranes which are free to travel over it without interference.



2-ton gantry crane in core storage section. One of four gantries on the same runway operating under an overhead traveling crane, providing handling service for local areas.

5-ton completely motorized gantry crane in a ladle repair room. The gantry makes it an easy job to move ladles around as desired for relining and necessary repairs.

BECAUSE Cleveland Tramrail gantry cranes are easily installed to operate under other cranes or overhead materials handling systems, many foundries have found them very valuable. They provide additional materials handling service so often needed for local or spot handling in various areas without interference with existing top-running cranes.

Much time lost by workers waiting for crane service is saved when gantry cranes are provided. Because they are relatively inexpensive, several can usually be purchased for less than the price of a standard overhead crane.

WRITE FOR FREE COPY of Engineering and Data Booklet No. 2008. Packed with helpful information

CLEVELAND TRAMRAIL

Overhead Materials Handling Equipment

CLEVELAND TRAMRAIL DIVISION • THE CLEVELAND CRANE & ENGINEERING CO. • 3842 E. 286 ST. • WICKLIFFE, OHIO

Circle 570 on Page 53

POSITIVE DUPLICATION – EVERY TIME!

(PD)° Distinctive bullet markings occur every time a bullet leaves the same gun barrel. The barrel rifling grooves the slug, making possible *positive identification*—an important contribution to the science of ballistics.

CUT CLEANING COSTS

with CINCINNATI (PD) SNAGGING WHEELS. Take aim at your cleaning room costs. You'll be right "on target" with such wheels as the stand grinder wheels shown above. Let a highly trained and experienced CINCINNATI grinding specialist help you quickly determine the best grading for your stand, swing frame, and portable grinders.

KEEP COSTS CUT

Once you have the CINCINNATI (PD) WHEEL that gives you the lowest labor and wheel cost, you can be sure that every *reorder* wheel will act and grind exactly like the *original* wheel. The remarkable CINCINNATI (PD) manufacturing process gives you Positive Duplication . . . time after time after time. CINCINNATI (PD) WHEELS cut your costs . . . and *keep them cut*!

CALL CINCINNATI

For a CINCINNATI grinding specialist, to help you work down your cleaning room costs, call your CINCINNATI (PD) GRINDING WHEELS distributor, or contact Cincinnati Milling Products Division, Cincinnati 9, Ohio.

PD POSITIVE DUPLICATION

CINCINNATI®

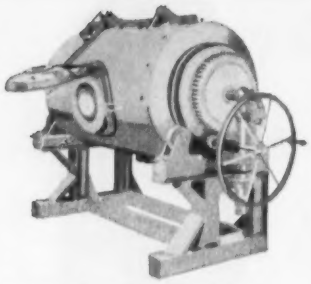
GRINDING WHEELS

°Trade Mark Reg. U. S. Pat. Off.

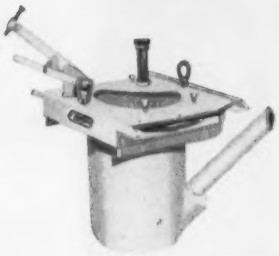
A PRODUCTION-PROVED PRODUCT OF THE CINCINNATI MILLING MACHINE CO.

Circle 571 on Page 53

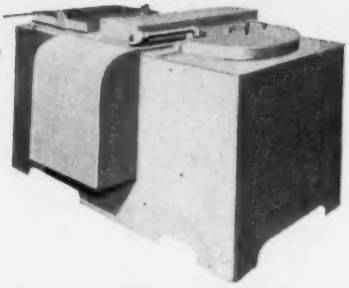
Wherever industry needs heat ... There's LINDBERG equipment just right for the specific job



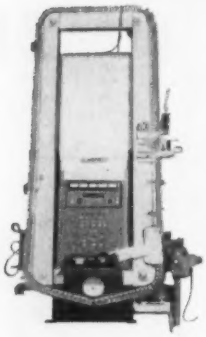
Rotary Open-Flame Smelting Furnaces: Lindberg-Fisher Simplex (shown) either oil or gas fired with capacities to 30,000 lbs. brass, 2,400 lbs. aluminum.



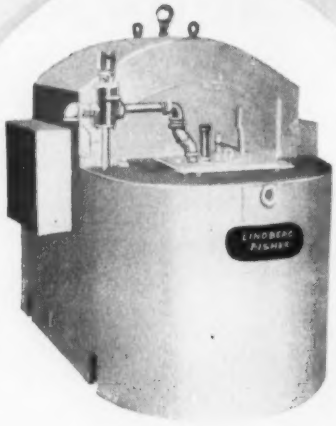
Automatic Ladling Units: The Autoladle "Little Joe". The first practical automatic aluminum ladling unit yet devised.



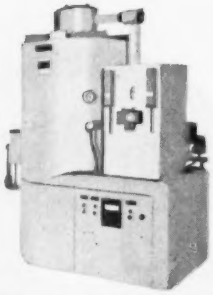
Induction Melting and Holding Furnaces: Lindberg-Fisher two-chamber furnace (shown) melts in one chamber, holds at correct temperature in other.



High Frequency Units: Vertically designed, completely automatic "HF" unit (Shown) for aluminizing automotive valves.

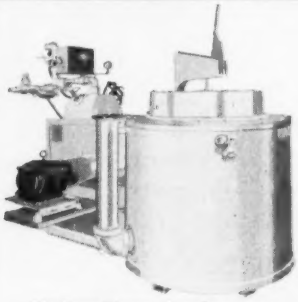


Melting and Holding Furnaces: Electric resistance furnace (shown) with capacities of 750 lbs. to 1500 lbs.

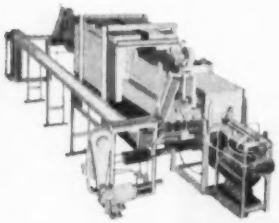


Atmosphere Generators: Hyen generator (shown) for endothermic atmospheres. Generators for all required atmospheres.

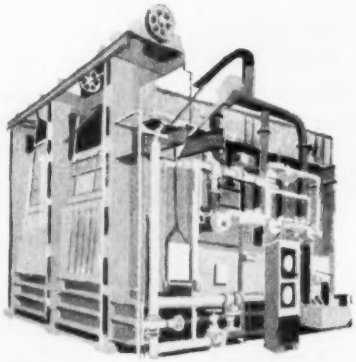
Pilot Plant Equipment: Atmosphere tube unit (shown) for ceramic research and development at temperatures up to 2750° F.



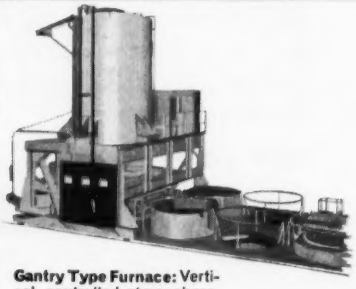
Cyclone Tempering Furnaces: Batch type fuel-fired tempering furnace (shown). Famous in metal treating industry for years.



Ceramic Kilns: Fully automatic, atmosphere controlled kiln (shown) has 5 control zones for flexibility. Maximum temperature, 2700° F.



Aluminum Reverberatory Furnaces: Twin-chamber melting and holding furnace (shown) with 45,000 lbs. capacity.



Gantry Type Furnace: Vertical, controlled-atmosphere, drop bottom, hardening furnace. Complete installation field-installed by Lindberg.

Lindberg-Designed

furnaces, more than 75 of them, help Ford Motor Company maintain casting production and quality standards

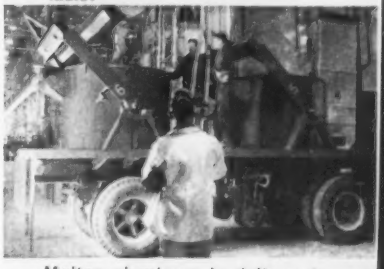
The new Aluminum Castings Plant of Ford Motor Company, Engine and Foundry Division, at Sheffield, Alabama, is a model of modern production efficiency. Contributing to its effective operation is a huge battery of Lindberg-Fisher aluminum holding furnaces, more than 75 of them. Eight large 65,000 lb. capacity reverberatory holding furnaces receive molten aluminum delivered from an adjacent Reynolds Metals plant and hold it at the desired temperature. Six other reverberatory furnaces, each with 20,000 lb. capacity, are used for remelting scrap aluminum from trimmed parts and holding metal at its usable temperatures. Molten metal is then delivered to more than 60 electric resistance holding furnaces in the casting area as needed. This unique installation, developed by Ford engineers in conjunction with Lindberg, is a major factor in maintaining the high quality product and production standards required by Ford.

Lindberg equipment and Lindberg planning can help you find the most effective answer to any problem of applying heat to industry. We cover the field, melting and holding, heat treating, tempering, brazing, enameling furnaces, ceramic kilns, high frequency units, and are in the ideal position to recommend just the type of equipment most suitable for your needs. This can be factory built or field-installed in your own plant, fuel-fired or electric. Consult your local Lindberg Field Representative (see the classified phone book) or get in touch with us direct. Lindberg-Fisher Division, Lindberg Engineering Company, 2453 West Hubbard Street, Chicago 12, Illinois. Los Angeles Plant: 11937 South Regentview Avenue, at Downey, California.

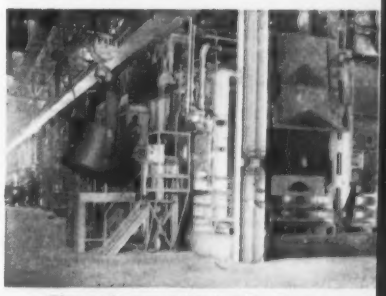
Handsome entrance to new plant of Ford Motor Company, Sheffield, Alabama.

Metal temperatures are positively controlled through Lindberg Control Panel.

Some furnaces are arranged for hand ladling and others are equipped with Lindberg Autoladle.



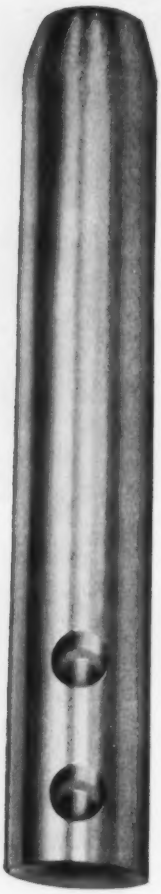
Molten aluminum is delivered direct to reverberatory holding furnaces.



The molten metal is held in these 14 huge furnaces for distribution to the casting areas.

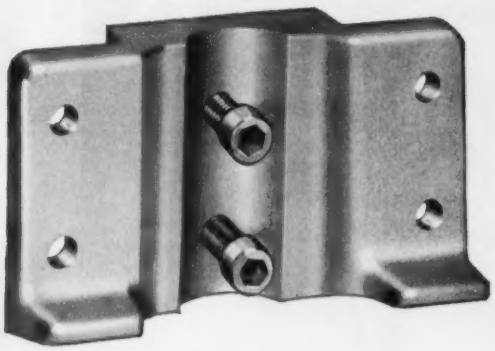
LINDBERG heat for industry

Circle 572 on Page 53



ADAMS 1" ROUND PIN

Side Mounting—Reversible
Countersunk Both Sides
Hardened—Ground
Hard Chrome Plated

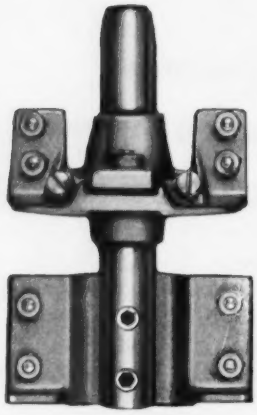


ADAMS 1" ROUND PIN BASE
(Cast Aluminum)

For Side Mounted Reversible Pins
Pins Mounted with Allen
Hollow Head Set Screws

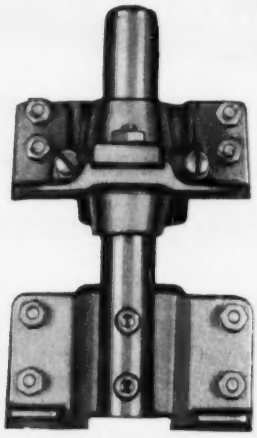
ADAMS MATCH PLATE EAR

Extra Long for
1" diameter Pins
(Side Mounted)



ADAMS 1" ROUND PIN AND EAR
(For Cherry Flasks)

Side Mounting Permits Use of
Extra Long Match Plate Ear As-
suring Expert Deep Pattern Draw



ADAMS 1" ROUND PIN AND EAR

(For Aluminum Flasks)
Side Mounting Assures Rigidity
of Pin. Adds Extra Life Because
of Simple Reversible Feature

1883—ADAMS QUALITY AND PRECISION—1959

Adams Quality and Precision remains constant through rigid specifications governing the manufacture of all New Flask Equipment or Flask Trimmings to be used for Part Replacement. Write us today. Your equipment problems can be solved by Adams.

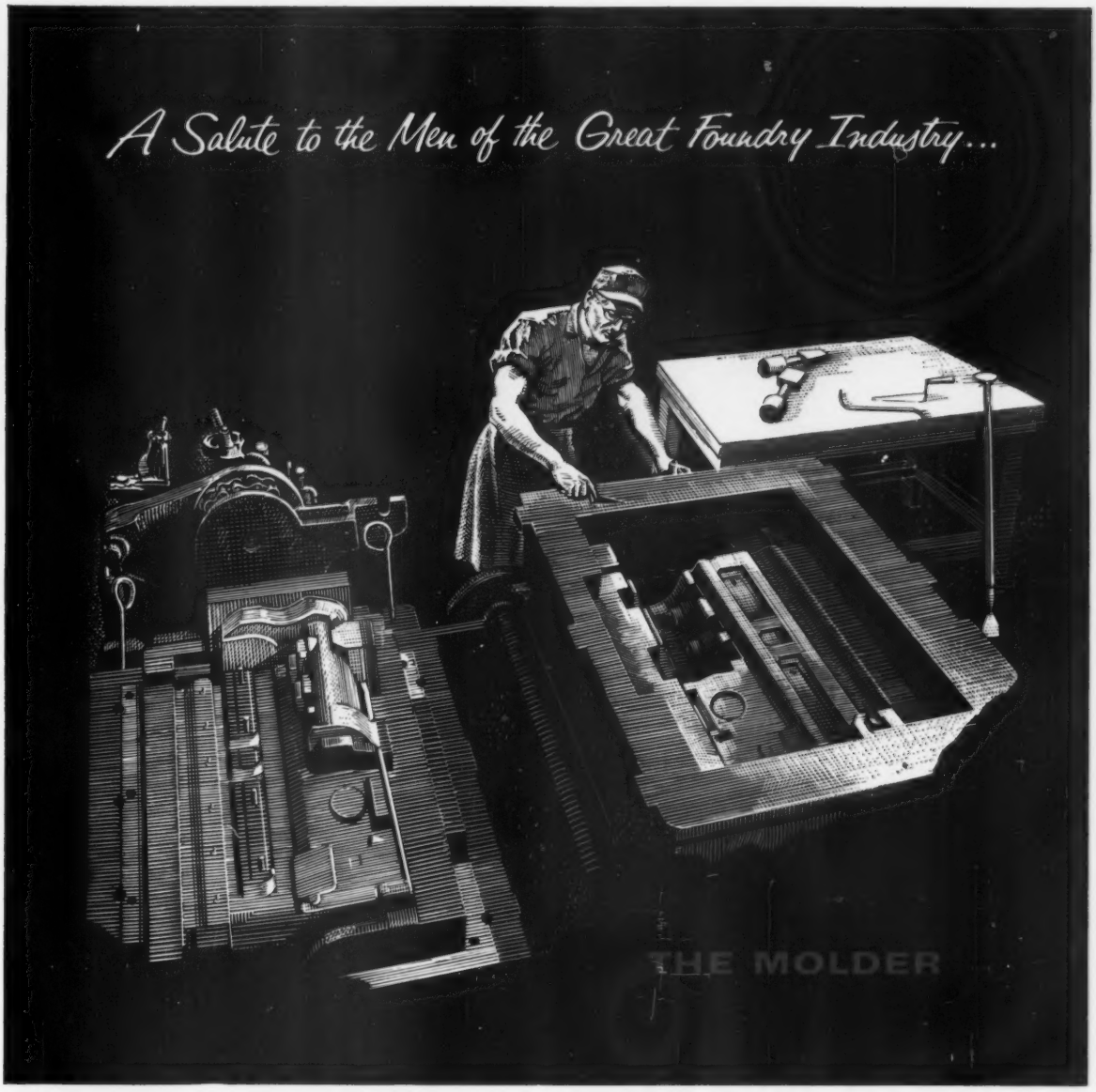
The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

700 FOSTER STREET, DUBUQUE, IOWA, U.S.A.

Circle 573 on Page 53



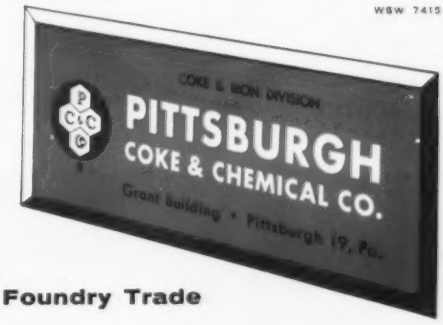
MOLD-MAKING is a key operation in the foundry industry. Although modern foundry practices have done much to mechanize the production of molds, the work of the hand molder is still a vital ingredient in the production of many castings.

His skill in hand-tamping the mold and in dressing it to final, accurate form is largely responsible for the high quality of castings produced by America's foundries.

Pittsburgh Coke & Chemical is proud to salute the gray iron foundry Molder. It is equally proud to serve as a basic supplier of two quality products for the nation's foundry trade . . . NEVILLE PIG IRON and NEVILLE FOUNDRY COKE.

An enlarged (11½" x 12") reproduction of the above etching, suitable for framing, will be sent without cost, upon request. Reproductions of the etching from the first advertisement of this series, featuring the Pattern Maker, are also available.

WSW 7415



Neville Pig Iron and Neville Coke for the Foundry Trade

PIG IRON • COKE • FERROMANGANESE • CEMENT • COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON

Circle 574 on Page 53

International Automation Corporation presents

THE NEW TRIED AND PROVEN "BUHRER" SAND COOLER

LOW COST OPERATION
Less than 1 cent per ton (for direct operation).

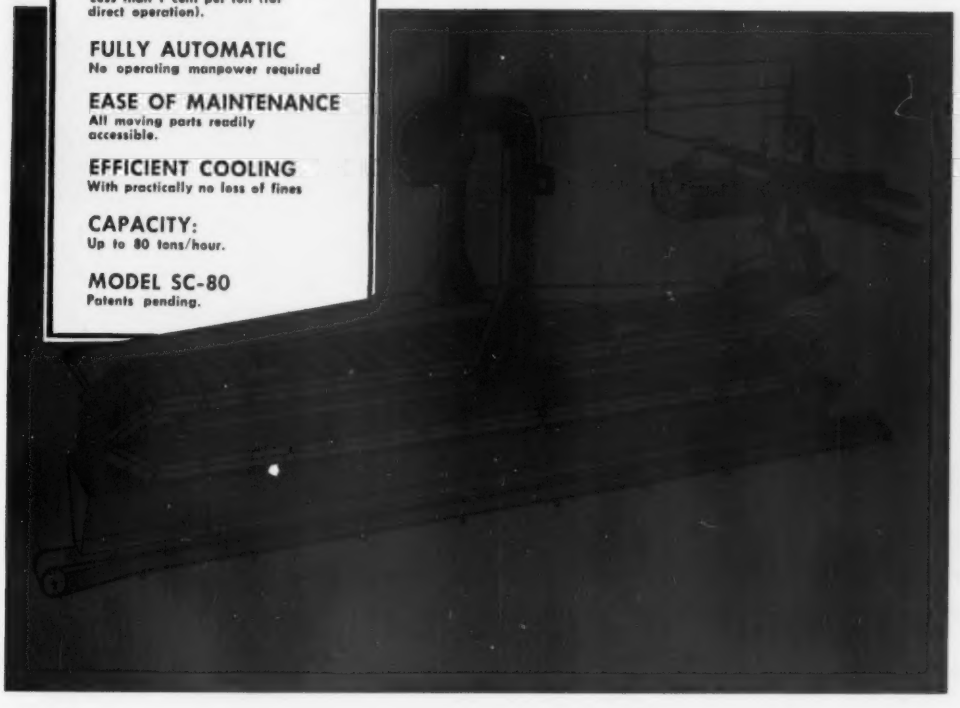
FULLY AUTOMATIC
No operating manpower required

EASE OF MAINTENANCE
All moving parts readily accessible.

EFFICIENT COOLING
With practically no loss of fines

CAPACITY:
Up to 80 tons/hour.

MODEL SC-80
Patents pending.



Save by reducing casting defects.

Save by reducing the use of parting agents.

No loss of "Fines".

No loss of re-usable binder.

Save on binder additions.

Much better control of sand properties at the mill and at the molding stations.

Save on maintenance cost.

Better working conditions.

Perfect control of molding sand properties is an absolute necessity for any successful molding operation.

Strength, permeability, flowability, etc., must be accurately controlled in the mixing unit and, equally important, these properties must be stable to insure uniformity at the molding stations.

Only the use of a cool sand guarantees stability. Variations in sand properties, caused by varying evaporation of the moisture, are eliminated.

The use of hot molding sand not only causes control loss of sand properties at the molding stations, but is also directly responsible for many casting defects.

IAC

INTERNATIONAL AUTOMATION CORP.

121 Huron View Blvd., Ann Arbor, Michigan
Phone NOrmandy 2-1342

INTERNATIONAL AUTOMATION CORPORATION

Gentlemen: Please send me, without any obligation on my part, a free copy of your bulletin SC-80.

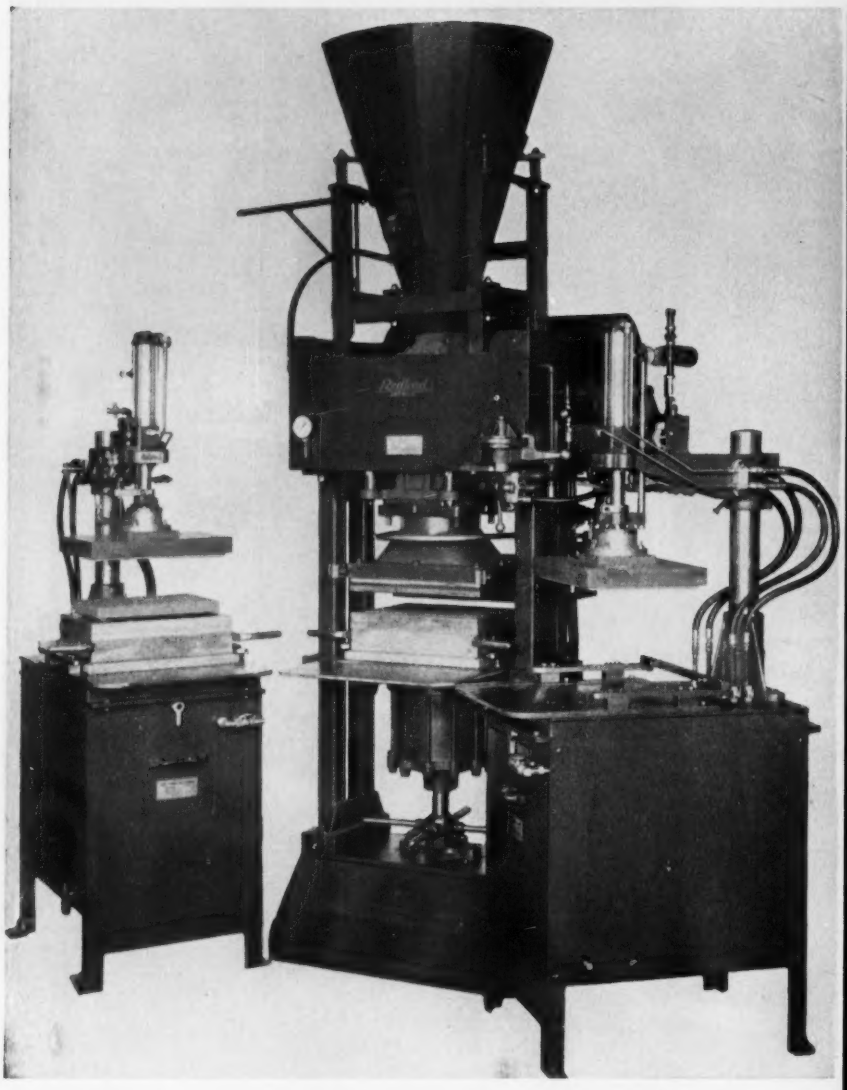
NAME ..... TITLE .....

COMPANY .....

ADDRESS .....

.....

Circle 576 on Page 53



REDFORD CO_2 MOLD MAKING EQUIPMENT

Here is a proven way of applying the CO_2 process to the production of small castings. With the above Redford #420-D Core Blower and (2) Model H-2-M Gassing Stations, one mold is being blown and squeezed while another one is automatically gassed and stripped. Up to 80 complete molds (cope and drag) are produced in one hour. Molds are flat and can be stacked for pouring. Metal yield is greatly increased. Very little floor space is required. Millions of small parts have been cast to close tolerances at reduced costs. For complete information write for BULLETIN No. 421.

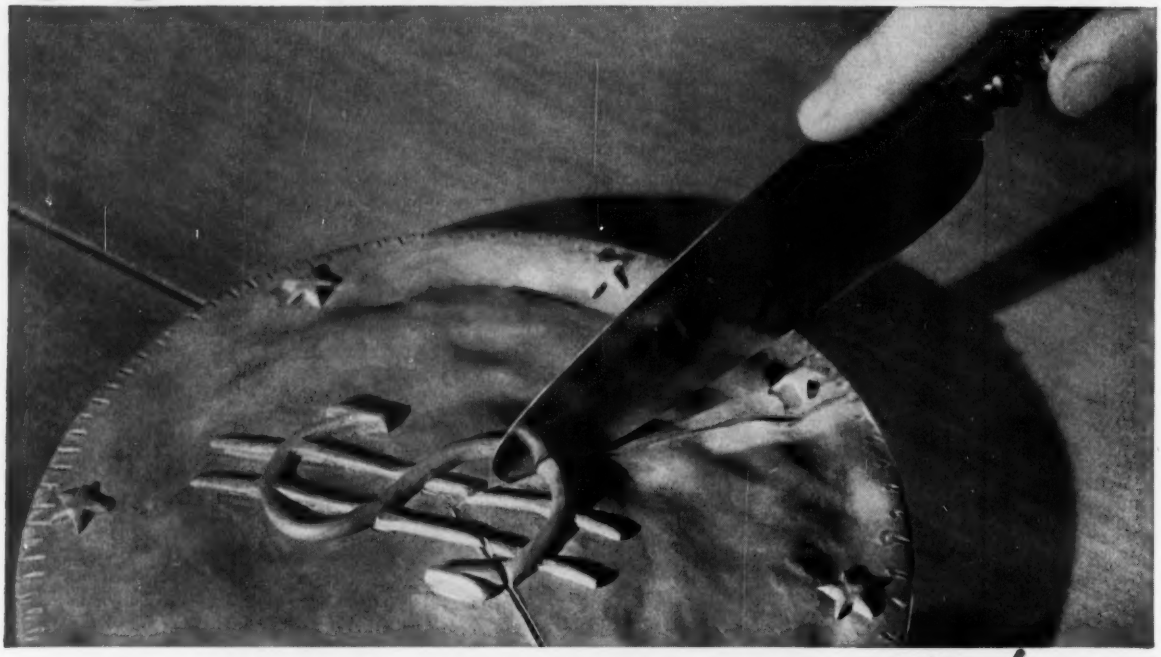
Redford IRON & EQUIPMENT CO.
20733 Glendale • Detroit 23, Michigan
Phone: KEnwood 1-8611

TYPICAL CO_2 MOLD CASTINGS

½ Actual Size

Circle 575 on Page 53

CONTROLLED "T"®



CUT YOURSELF A SLICE OF *profits!*

If you now use hard (chilled) iron abrasives—and almost half of all abrasives used still fall into this category—may we suggest **CONTROLLED "T"®**, with its exclusive and unique properties?

No doubt you selected hard iron abrasives because you wanted: fast cleaning and cutting action (the ability to remove sand and scale) and the "keying" action (where the product will receive further processing). Disadvantages of ordinary chilled shot and grit, of course, lie in their rapid breakdown (causing high consumption) and in their extreme high hardness (causing excessive wear on blades, control cages, impeller, liners, etc.)

CONTROLLED "T"®, made to a specific BHN, is an "iron fist in a velvet glove." Its controlled specifications are such that you enjoy the speed and cutting action of chilled, without the disadvantages of rapid breakdown and high maintenance costs. Savings: as much as 50% on consumption, as much as 40% on maintenance! You can cut yourself a generous slice of profits with these important cost-cutting features of **CONTROLLED "T"®**. If this sounds like a fairy tale, try us! We won't upset your operations with a test, there is a simple and inexpensive way to tell. Cost-conscious customers have been enjoying these extra profits for over a decade!

If you are using ordinary annealed or steel abrasives, you'll want to try our **PERMABRASIVE®**, the pearlitic malleable shot and grit with a controlled hardness range that saves you money through faster cleaning and lower cost per ton. Or **PERMA-STEEL®**, the low cost "work-horse" of the long-life abrasives, may fit your special application perfectly to produce many of the same cost-cutting advantages.

FREE: *the* NEW *"Second Reader on the use of shot and grit." Write for your copy.*

Sold Exclusively by
HICKMAN, WILLIAMS & COMPANY (Inc.)
Chicago · Detroit · Cincinnati · St. Louis · New York · Cleveland · Philadelphia · Pittsburgh · Indianapolis

Exclusive West Coast Subdistributors
BRUMLEY-DONALDSON COMPANY
Los Angeles · Oakland

NATIONAL
METAL ABRASIVE COMPANY
3560 Norton Rd. • Cleveland 11, Ohio
Western Metal Abrasives Co. (Affiliate)
101 E. Main Street • Chicago Heights, Illinois
Sole manufacturers of Permabrasive® and Controlled "T"® abrasives.

Circle 577 on Page 53

Late News

UPTURN IN MALLEABLE: Sales of malleable castings in 1959 will increase at least 18 per cent over the 1958 level—estimated to have been about 675,000 tons—according to the 1959 sales forecast of the Malleable Founders' Society, Cleveland. This figure is based on increases of 20 per cent in all market areas except automotive, for which a conservative 10 per cent is predicted. A 5-million car year would increase 1959 malleable iron production to 825,000 tons, and a 6-million car year would boost the total to 900,000 tons. The society's forecast is more cautious than that of individual members, who predicted an average 25 per cent increase in a recent survey by MFS.

Backing up this confidence, MFS member companies reported that 75 per cent of them will invest in capital improvements during 1959. Anticipated capital expenditures by firms which responded to the survey will exceed $6 million. Much of this money will be spent to increase production of pearlitic malleable iron and for design and testing facilities.

AFS CASTINGS CONGRESS: The American Foundrymen's Society reports good progress on the 63rd Castings Congress and combined Engineered Castings Show, to be held in Chicago April 13-17. By Jan. 22, nearly 70 exhibitors had arranged displays, including foundries, metal and alloy producers, manufacturers of analysis and inspection equipment, and companies making patterns and dies for metal casting. The technical program will include about 100 papers covering all foundry activi-

Foundry Statistics

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap Total	By Types of Furnace — Cupola Total	Air Total	Electric Total
1956	71,709,489	9,817,287	1,133,128	9,562,887
1957				
Sept.	5,033,998	721,125	82,948	672,597
9 mo.	51,194,922	6,525,054	792,223	7,017,722
Oct.	5,333,767	817,338	91,766	718,791
Nov.	4,858,489	716,095	72,871	589,879
Dec.	4,281,414	661,918	70,091	542,008
Total	65,688,592	9,220,405	1,026,951	8,876,400
1958				
Jan.	4,072,071	704,654	76,989	566,225
Feb.	3,491,441	611,394	64,971	466,657
Mar.	3,718,132	624,165	64,866	524,035
Apr.	3,429,121	599,427	61,839	631,220
May	3,862,491	596,253	59,060	553,756
June	4,409,006	615,271	62,703	605,733
July	3,716,739	543,726	47,203	513,394
Aug.	4,203,034	580,844	66,877	592,727
Sept.	4,472,219	680,660	71,198	637,400
9 mo.	35,374,254	5,556,394	575,706	4,991,147

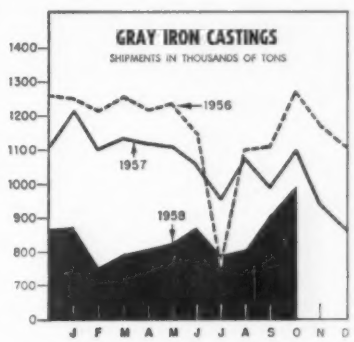
Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1957	1958
Jan.	117.9	57.9
Feb.	188.4	57.6
Mar.	127.0	85.9
Apr.	101.1	88.7
May	136.2	136.1
June	187.5	87.7
July	98.6	77.9
Aug.	231.3	74.1
Sept.	113.9	64.5
Oct.	145.3	118.9
Nov.	59.6	83.3
Dec.	61.4	....

Note: Base period 1947-49 taken as 100 per cent monthly average.
Source: Foundry Equipment Manufacturers Association.



GRAY IRON CASTINGS—SHIPMENTS (Net tons[2])

	All Castings — Total	All Castings — For Sale	Miscellaneous Castings Total	Miscellaneous Castings For Sale	Nodular Iron Castings Total	Heavy Steel Ingot Molds Total	Chilled Railroad Car Wheels Total	Pressure Pipe & Fittings Total[3]	Soil Pipe & Fittings Total[3]	Unfilled Orders[3]
1956	13,860,527	7,960,391	5,265,526	3,647,991	.....	2,624,146	406,191	1,746,902	817,762	.....
1957										
Oct.	1,099,554	601,109	668,895	282,024	11,974	210,521	26,306	122,149	71,683	740,189
10 mo.	10,860,140	5,950,095	6,629,783	2,841,692	.....	2,094,564	311,857	1,186,707	637,229	.....
Nov.	940,138	482,732	599,292	242,847	10,601	166,652	24,302	91,138	58,754	704,623
Dec.	864,226	443,670	557,154	226,356	9,810	148,074	23,173	73,500	62,325	675,838
Total	12,664,504	6,876,497	7,786,229	3,310,915	.....	2,409,290	359,332	1,351,345	758,308	.....
1958										
Jan.	868,255	436,393	580,545	229,014	10,800	135,110	23,511	78,863	50,228	635,069
Feb.	753,306	389,705	503,175	203,717	10,245	116,168	25,959	67,606	40,393	632,490
Mar.	795,568	446,822	499,751	215,916	9,485	125,887	24,777	87,716	57,437	589,912
Apr.	806,720	457,498	483,999	210,344	8,015	121,489	25,401	112,292	63,539	582,446
May	820,054	472,192	469,026	203,025	5,671	134,312	23,498	123,017	70,201	570,293
June	867,948	541,904	503,252	245,651	5,773	135,477	22,928	129,671	76,629	572,706
July	791,560	465,650	430,882	185,275	3,999	157,478	19,928	110,790	72,481	580,155
Aug.	802,473	513,862	410,876	205,821	4,211	165,006	18,537	129,157	78,897	614,199
Sept.	916,704	537,717	518,185	227,414	4,622	175,323	20,783	125,693	76,720	644,834
Oct.	992,730	586,614	551,380	253,062	4,193	207,500	22,970	129,375	81,505	619,667
10 mo.	8,415,318	4,848,365	4,951,071	2,179,239	67,014	1,473,750	228,312	1,094,180	667,844	.....

*Source: U. S. Dept. of Interior, Bureau of Mines. [2]Source: Bureau of Census. [3]For sale only. [4]All cast iron pipe is shipped for sale.

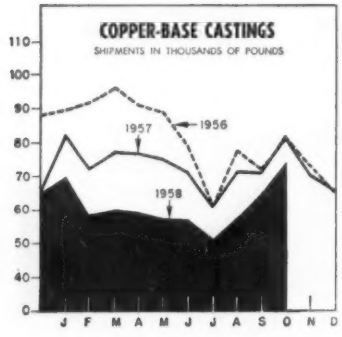
ties and including some written specifically for design engineers and buyers of castings. More than 50,000 designers and buyers will have been contacted before the show opens.

IHEA ELECTS: R. L. Harper, executive vice president, Harper Electric Furnace Corp., Buffalo, was elected president of the Industrial Heating Equipment Association at its annual meeting in Cleveland. W. E. Benninghoff, vice president, Ohio Crankshaft Co., Cleveland, was elected vice president and Roy Snyder, W. S. Rockwell Co., Fairfield, Conn., treasurer. Robert E. Fleming was re-elected executive vice president.

TECHNICAL SYMPOSIUM: Northeastern Ohio Chapter of AFS is offering a four-session technical symposium on Solidification and Heat Treatment of Cast Metals at Case Institute of Technology, Cleveland. Sessions are open to everyone, without charge. On Feb. 24, Prof. John F. Wallace, Case, will review the general subject. On March 4, William L. Rudin, Elesco Smelting Corp., Chicago, and Edward E. Stonebrook, Aluminum Co. of America, Cleveland, will discuss copper-base and aluminum and magnesium alloys respectively. B. C. Yearley, National Malleable & Steel Castings Co., Cleveland, will cover steel and malleable iron on March 10, and Ralph Clark, Union Carbide Metals Co., will discuss gray, ductile, and alloy irons on March 17.

PERSONALS: Donald L. Price has been elected a vice president, Norton Co., Worcester, Mass. Robert Cushman succeeds him as sales manager, grinding wheels . . . Donald R. Hepler has been appointed vice president of manufacturing, Cooper Alloy Corp., Hillside, N. J. . . . William E. Thomas has been named assistant to the vice president of operations, United Engineering & Foundry Co., Pittsburgh . . . Richard L. Downing has become sales manager at Stroh Die Casting Co., Milwaukee . . . Lovell Shockey has been made sales manager, Cleveland Works, National Malleable & Steel Castings Co. He succeeds Donald L. Griffith, who becomes sales co-ordinator for the company's Industrial Div. The Industrial Div. has created a product engineering department which will be headed by

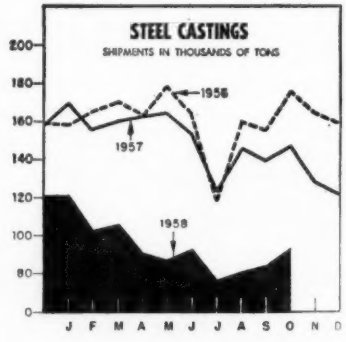
Foundry Statistics



COPPER-BASE CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments			
	Total	Sand	Perm. Mold	Unfilled Orders[2]
1956	966,306	866,545	57,522	.....
1957				
Oct.	81,836	74,391	3,693	39,063
10 mo.	739,485	665,769	38,694	.....
Nov.	70,187	63,944	3,006	34,249
Dec.	65,708	59,605	3,046	31,509
Total	875,389	788,319	44,696	.....
1958				
Jan.	69,707	63,294	3,327	30,341
Feb.	58,356	52,579	3,202	27,243
Mar.	60,157	54,007	3,395	25,434
Apr.	59,311	53,271	3,385	25,621
May	57,506	51,634	3,077	22,867
June	57,124	51,967	3,001	21,578
July	51,124	46,636	2,351	20,518
Aug.	57,790	52,981	2,425	24,851
Sept.	64,447	58,435	2,888	25,655
Oct.	74,012	67,564	3,239	26,726
10 mo.	609,504	552,368	30,290	.....



STEEL CASTINGS—SHIPMENTS

(Net tons[1])

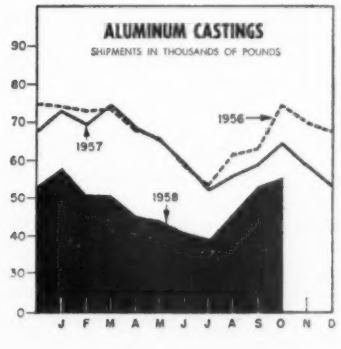
	All Castings			Carbon			Alloy			
	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Total	For Sale	Railway Specialties	Unfilled Orders[2]
1956	1,931,987	1,512,290	368,918	1,444,768	1,122,109	345,091	487,219	390,181	23,827	.....
1957										
Oct.	146,397	113,216	31,477	110,100	85,144	29,320	36,297	28,072	2,157	395,907
10 mo.	1,518,289	1,169,186	298,764	1,147,034	880,776	278,068	371,255	288,410	20,726	.....
Nov.	127,115	98,436	26,892	93,343	71,846	25,105	33,772	26,590	1,787	362,948
Dec.	120,787	92,125	23,403	88,101	66,468	21,808	32,686	25,657	1,595	327,337
Total	1,766,191	1,359,747	349,059	1,328,478	1,019,090	324,951	437,713	340,657	24,108	.....
1958										
Jan.	120,722	94,717	22,545	87,525	68,203	21,115	33,197	26,514	1,430	304,907
Feb.	103,297	79,708	16,647	74,283	56,781	15,273	29,014	22,927	1,374	282,358
Mar.	106,233	82,195	16,180	77,564	60,208	15,240	28,669	21,987	940	252,840
Apr.	91,464	69,121	11,956	65,639	48,998	11,107	25,825	20,123	849	229,503
May	87,002	66,086	10,416	61,105	45,967	9,463	25,897	20,119	953	211,346
June	92,861	71,624	14,185	67,227	50,919	12,987	25,634	20,705	1,198	190,779
July	68,802	48,618	5,400	46,858	32,161	4,656	21,944	16,457	744	200,272
Aug.	80,886	59,816	8,021	57,539	42,069	7,090	23,347	17,747	931	196,300
Sept.	85,277	64,586	9,205	60,392	44,890	7,905	24,885	19,696	1,300	196,482
Oct.	95,389	73,367	12,254	67,906	51,065	10,980	27,483	22,302	1,274	184,925
10 mo.	934,933	709,838	126,809	666,038	501,261	115,816	265,995	208,547	7,993	.....

[1]Source: Bureau of Census. [2]For sale only.

Leslie N. Schuman. He is succeeded as general superintendent of Cleveland Works by Charles Schneider . . . Allen H. Jones has been elected vice president of sales and engineering, W. W. Sly Mfg. Co., Cleveland . . . Harry G. Schlichter, vice president-sales, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago, will retire on March 31. Roy F. Nosek will be director of sales . . . Charles C. Jarchow has been elected chairman of the board, American Steel Foundries, Chicago. He is succeeded as president by Joseph B. Lanterman . . . Prof. George J. Barker is retiring after 37 years in the department of mining and metallurgy, University of Wisconsin.

OBITUARY: Harry W. Impey, for 46 years associated with the Tabor Mfg. Co., Philadelphia, in the New England area, died Jan. 21 . . . Theodore Kaufman Sr., 92, board chairman, S. Obermayer Co. and Ramtite Co., both of Chicago, died Jan. 14 . . . Joseph M. Fabian, 68, founder, Michigan Avenue Foundry, Chicago, died Dec. 19 . . . Arthur S. Leach, 79, former owner, Model Brass Foundry, Dallas, Tex., died Jan. 9.

MISCELLANY: Demmler Mfg. Co., Kewanee, Ill., and Taccone Pneumatic Foundry Equipment Co., North East, Pa., have collaborated on the manufacture of a new molding machine which incorporates Demmler's shoot principle for flask filling and the Taccone diaphragm-squeeze principle . . . A. P. Green Fire Brick Co., Mexico, Mo., will build a $2 million plant to produce basic refractories at Tarentum, Pa. . . . Grimm Foundry Co., Bound Brook, N. J., has been closed . . . Roto-Finish Co., Kalamazoo, Mich., manufacturer of barrel finishing machinery, has purchased Ransohoff Inc., Hamilton, Ohio, producer of metal treating and finishing equipment and foundry mills . . . Investment Casting Institute, Chicago, is organizing an American delegation to attend the European Investment Casting Congress at Essen, Germany, May 31 to June 3 . . . University of Illinois, Urbana, Ill., will be the site of the 4th Foundry Instructors Seminar of American Foundrymen's Society, June 18-20 . . . Production of primary aluminum during December, 1958, hit an all-time monthly record of 152,301 tons. Total 1958 tonnage came to 1,564,341 tons.



PRODUCTION WORKERS

Estimated Number

	Oct. 1958	Sept. 1958	Oct. 1957
Ferrous	158,600	164,800	195,800
Nonferrous	47,300	47,700	57,200

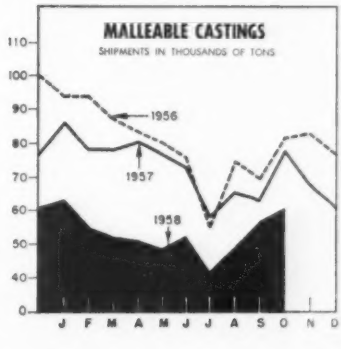
Average Weekly Earnings

Gray Iron	$83.10	$87.25	$83.85
Malleable Iron	84.27	88.94	84.29
Steel	94.35	92.61	93.21
Nonferrous	94.87	95.18	91.64

Average Weekly Hours

Gray Iron	37.1	38.1	37.6
Malleable Iron	36.8	38.5	37.8
Steel	38.2	37.8	39.0
Nonferrous	40.2	40.5	39.5

Source: Bureau of Labor Statistics.



ALUMINUM CASTINGS

(Shipments of castings—1000 pounds[1])

	Shipments				Unfilled Orders[2]
	Total	Sand	Perm. Mold	Die	
1956	794,581	171,181	245,421	376,230	.....
1957					
Oct.	64,140	11,570	20,543	31,936	91,817
10 mo.	639,656	124,438	196,991	322,115	.....
Nov.	58,898	10,411	18,611	29,793	91,860
Dec.	53,102	9,302	16,724	26,978	86,323
Total	751,656	144,151	232,326	369,086	.....
1958					
Jan.	57,845	10,724	18,082	28,937	77,067
Feb.	50,695	9,601	15,456	25,279	75,647
Mar.	50,547	9,311	15,255	25,918	63,600
Apr.	44,948	9,531	13,369	21,956	60,317
May	44,093	9,312	13,648	21,091	59,666
June	40,701	8,644	13,679	18,292	63,670
July	38,818	8,658	12,342	17,714	68,618
Aug.	45,034	9,034	14,426	21,505	71,135
Sept.	52,796	10,261	16,241	26,254	72,819
Oct.	55,699	10,932	17,189	27,511	73,474
10 mo.	481,176	96,008	159,687	233,200	.....

[1]Source: Bureau of the Census. [2]For sale only

MALLEABLE IRON CASTINGS

(Shipments of castings—net tons[1])

	Shipments		Standard		Pearlitic		Unfilled Orders[2]
	Total	For Sale	Total	For Sale	Total	For Sale	
1956	951,868	557,636	812,905	479,563	138,963	78,073	.....
1957							
Oct.	77,667	45,939	66,043	39,269	11,624	6,720	82,995
10 mo.	734,647	447,690	609,281	373,408	125,366	74,282	.....
Nov.	67,904	38,085	55,564	31,036	12,340	7,049	80,074
Dec.	60,425	34,343	48,694	27,218	11,731	7,125	74,863
Total	862,976	520,118	713,539	431,662	149,437	88,456	.....
1958							
Jan.	62,734	34,920	51,440	28,516	11,294	6,404	67,292
Feb.	54,650	31,006	45,419	25,381	9,231	5,625	59,047
Mar.	51,708	29,624	43,368	24,333	8,340	5,291	54,330
Apr.	50,695	29,388	41,794	23,605	8,901	5,783	47,664
May	48,306	26,656	40,092	21,710	8,214	4,946	46,603
June	51,882	31,077	42,910	25,679	8,972	5,398	48,260
July	41,865	24,479	33,857	20,023	8,008	4,456	58,340
Aug.	49,252	29,414	41,734	24,696	7,518	4,718	55,145
Sept.	56,836	31,999	45,945	26,370	10,891	5,629	58,405
Oct.	60,981	40,014	50,181	31,992	10,800	8,022	63,425
10 mo.	528,899	307,577	436,800	252,305	92,169	56,272	.....

Prices of Foundry Metals and Coke

(As of Jan. 26, 1959)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$18.00-18.50

OVEN

Birmingham	$30.35
Buffalo	32.00
Detroit	32.00
Erie, Pa.	32.00
Indianapolis	31.25
Kearny, N. J.	31.25
Milwaukee	32.00
Neville Island (Pittsburgh)	30.75
New England, deld.	33.55
Painesville, O.	32.00
Philadelphia	31.00
St. Louis	33.00
St. Paul	31.25
Swedeland, Pa.	31.00
Terre Haute, Ind.	31.25

PIG IRON

(Per gross ton, f.o.b. furnace)

	No. 2 Foundry	Malleable
Birdsboro, Pa.	$68.50	$69.00
Birmingham	62.50	66.50
Buffalo	66.50	67.00
Chester, Pa.	68.50	69.00
Chicago	66.50	66.50
Cleveland	66.50	66.50
Duluth	66.50	66.50
Erie, Pa.	66.50	66.50
Everett, Mass.	68.00	68.50
Fontana, Calif.	75.50	....
Geneva, Utah	66.50	....
Granite City, Ill.	68.40	68.90
Neville Island (Pittsburgh)	66.50	66.50
Swedeland, Pa.	68.50	69.00
Toledo, O.	66.50	66.50
Troy, N. Y.	68.50	69.00
Youngstown, O.	....	66.50

NONFERROUS INGOT

(Cents per pound, carlots)

BRASS AND BRONZE: Red brass, No. 115, 28.00; tin bronze, No. 225, 37.50; No. 245, 32.25; High-leaded tin bronze, No. 305, 32.25; No. 1 yellow, No. 405, 23.00; manganese bronze, No. 421, 24.75.

ALUMINUM: 99 per cent plus primary ingots 26.80. Secondary No. 12 alloy, 21.75-22.00. Deoxidizing grades: No. 1, 23.50; No. 4, 19.00.

MAGNESIUM: 99.8 per cent notched ingots 36.00, f.o.b. Velasco, Tex. (10,000 lb or more).

COPPER: Electrolytic 29.00, delivered Connecticut valley.

ZINC: High grade 12.50, delivered. Die casting alloy No. 3, 14.00; No. 2, 14.25, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$33.00-34.00	$53.00-54.00	.....	.....	.....	.....	$47.00-48.00
Boston*	**27.00-28.00	**33.00	.....	.....	**34.00	.....	.....
Buffalo	35.00-36.00	**43.00-44.00	.....	.....	**47.00-48.00	.....	53.00-54.00
Chicago	43.00-44.00	47.00-48.00	.....	55.00-56.00	55.00-56.00	57.00-58.00	58.00-60.00
Cincinnati*	**38.00-39.00	**45.00-46.00	**39.00-40.00	.....	**47.00-48.00	.....	**55.00-56.00
Cleveland	40.00-41.00	45.00-46.00	37.00-38.00	49.00-50.00	50.00-51.00	63.00-64.00	57.00-59.00
Detroit*	**35.00-36.00	**44.00-45.00	**35.00-36.00	**47.00-48.00	.....	.....	.....
Los Angeles	36.00	**47.00	.....	.....	.....	.....	.....
New York*	28.00-29.00	35.00-36.00	32.00-33.00	.....	.....	.....	.....
Philadelphia	36.00	39.00	41.00	.....	48.00-49.00	62.00	.....
Pittsburgh	43.00-44.00	44.00-45.00	.....	39.00-40.00	51.00-52.00	.....	56.00-58.00
St. Louis*	37.00	48.00	38.00	48.00	.....	.....	52.00
San Francisco	32.00-34.00	44.00	28.00	40.00	40.00	.....	.....
Seattle	31.00	31.00	28.00	.....	.....	.....	.....

*Brokers' buying prices. **F.o.b. shipping point

Foundry Statistics

ZINC-BASE CASTINGS

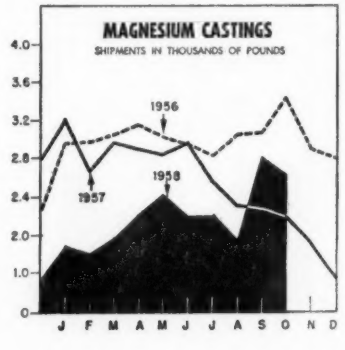
(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1956	693,728	449,516	.....
1957			
Oct.	62,332	39,990	69,275
10 mo.	555,314	360,321	.....
Nov.	58,689	35,005	63,665
Dec.	49,597	29,998	58,792
Total	663,600	425,334	.....
1958			
Jan.	50,568	30,368	55,883
Feb.	42,687	27,482	50,676
Mar.	39,719	26,782	43,366
Apr.	35,796	23,830	27,634
May	36,447	24,588	33,438
June	38,132	25,993	34,888
July	32,765	22,843	41,534
Aug.	35,860	26,971	45,066
Sept.	47,127	33,520	50,762
Oct.	45,045	36,103	58,154
10 mo.	404,146	278,480	.....

MAGNESIUM CASTINGS

(Shipments of castings—1000 pounds[1])

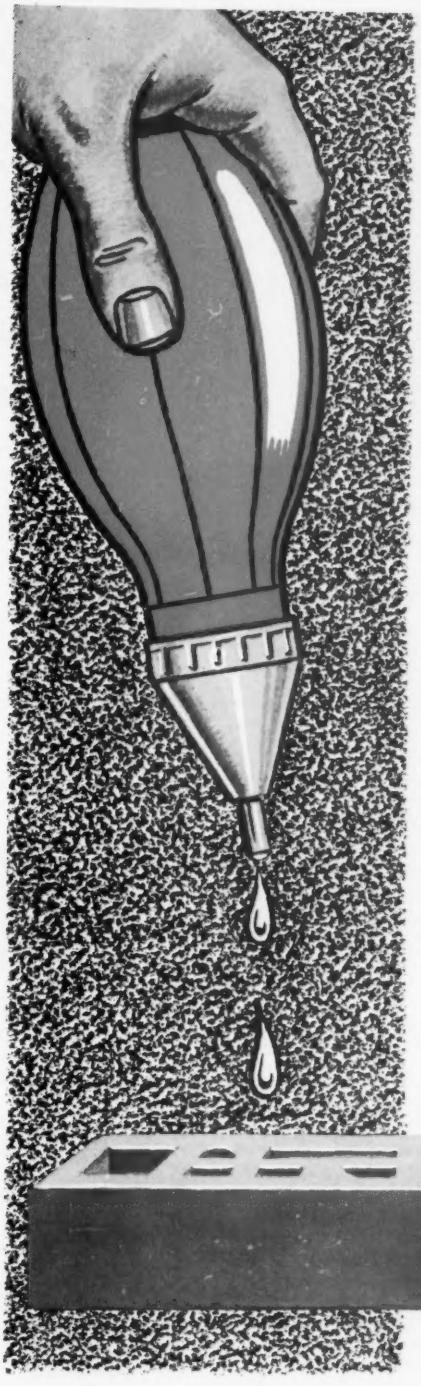
	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1956	36,165	33,580	.....
1957			
Oct.	2,192	2,093	5,318
10 mo.	26,869	25,238	.....
Nov.	1,920	1,806	4,802
Dec.	1,533	1,408	4,523
Total	30,322	28,452	.....
1958			
Jan.	1,881	1,756	5,227
Feb.	1,803	1,730	5,589
Mar.	1,975	1,860	5,555
Apr.	2,215	2,141	5,555
May	2,422	2,196	5,200
June	2,205	1,996	5,515
July	2,200	2,063	6,706
Aug.	1,869	1,808	6,088
Sept.	2,804	2,581	6,083
Oct.	2,627	2,479	5,463
10 mo.	22,001	20,610	.....



PIG IRON PRODUCTION AND CONSUMPTION

	Production**—Net Tons: Total	Foundry	Malleable & Silvery	Basic	Low Phos. Intermediate Low Phos. & Bessemer	Consumption*—Gross Tons: Total	Cupola	Air	Electric
1956	75,301,134	2,402,861	3,733,258	61,900,276	7,264,761	66,967,618	4,786,011	261,377	211,193
1957									
Nov.	5,711,242	153,722	290,547	4,759,255	507,718	5,073,398	309,674	14,886	17,199
11 mo.	73,344,087	2,110,521	3,468,438	60,736,515	7,028,613	.....	.....	.....	.....
Dec.	5,212,624	165,268	228,897	4,394,869	423,590	4,565,635	288,219	14,754	13,881
Total[3]	78,557,011	2,275,789	3,697,335	65,131,684	7,452,203	67,902,434	4,160,891	218,178	246,851
1958									
Jan.	4,785,269	100,097	232,802	4,036,451	415,859	4,208,692	306,794	16,102	14,428
Feb.	4,016,276	106,921	193,429	3,396,382	319,094	3,551,679	260,940	14,014	7,740
Mar.	4,418,778	156,356	227,785	3,645,353	389,284	3,824,140	270,214	13,472	8,753
Apr.	3,787,907	136,180	173,139	3,053,634	424,954	3,378,893	262,007	13,975	9,555
May	4,048,328	127,438	165,045	3,359,836	396,009	3,691,550	256,204	12,001	11,764
June	4,396,285	121,869	167,192	3,764,607	342,617	4,058,714	262,883	12,098	15,549
July	4,277,515	123,075	156,582	3,595,008	402,850	3,820,293	239,140	10,550	12,140
Aug.	4,768,581	141,185	145,216	4,085,669	396,511	4,324,052	247,428	13,196	32,309
Sept.	5,040,597	133,566	234,752	4,256,253	416,026	4,524,851	300,173	14,994	27,759
Oct.	5,835,995	146,386	257,111	4,856,692	575,806	.....	.....	.....	.....
Nov.	5,906,888	175,210	257,131	4,965,452	489,095	.....	.....	.....	.....
11 mo.	51,273,259	1,468,313	2,176,542	43,102,849	4,525,555	.....	.....	.....	.....

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Monthly figures do not add up to totals shown because of unreported monthly revisions.



Drop by Drop... IN 1958

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READY-TO-USE CORE PASTE

FOR THESE 12 ADVANTAGES

1. Unsurpassed for pasting CO^2 cores
2. Ready mixed, uniform at all times
3. Light colored, odorless, non-corrosive, non-fermenting
4. Dries rapidly at room temperatures
5. Unaffected by normal storage
6. Will not boil or blister
7. No appreciable gas generation
8. Pasted joints are stronger than core
9. Unaffected by mold humidity
10. Extra strong, uses 1/3 to 1/5 as much paste
11. Cores may be reheated without damaging pasted joints
12. Washes off hands and tools easily with warm water

Ask for literature or consult our representative

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LYQUAFLOUR
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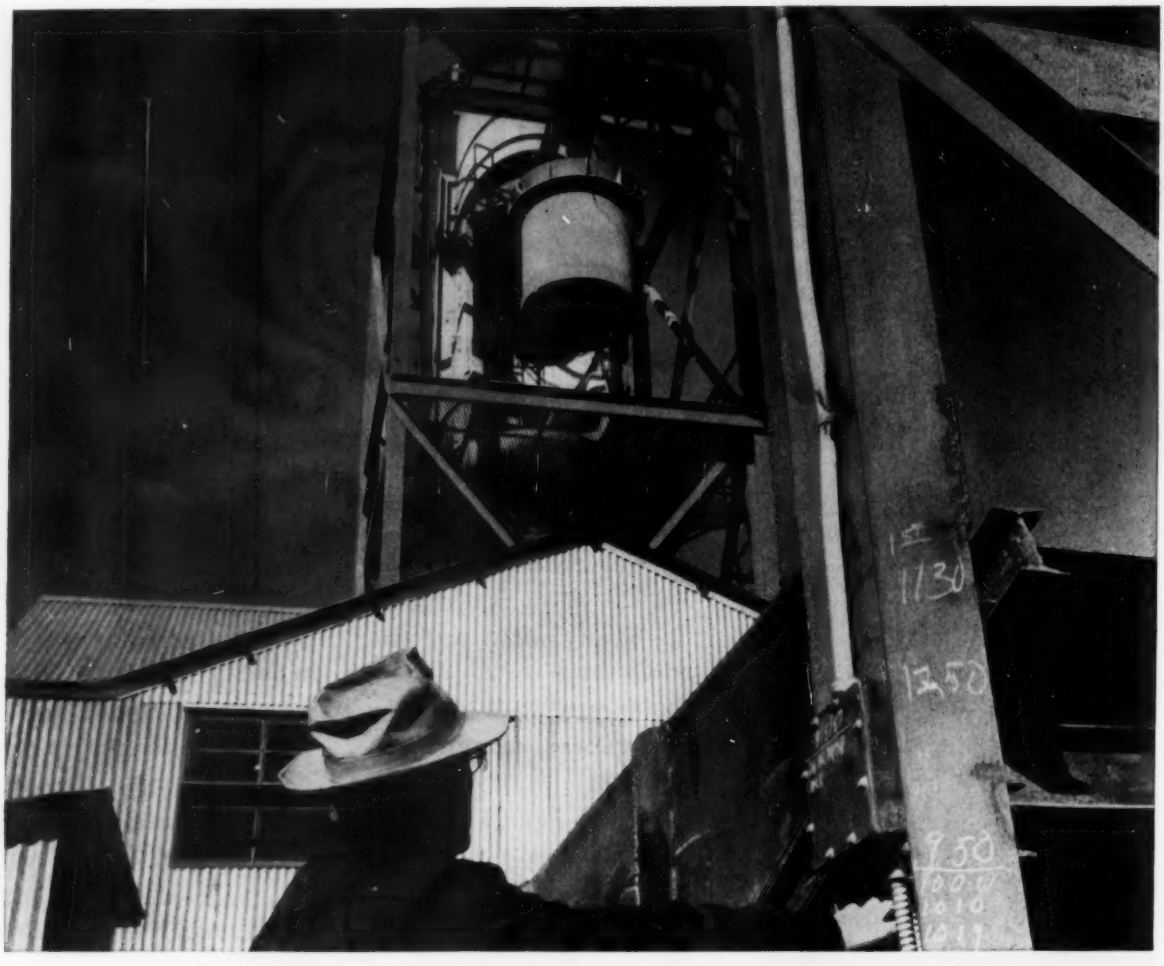
The Liquid sand grain coating

DOB-IT
Ready-to-use core mudding compound

DUO RESIN
Binder for baking with controlled oven temperatures

Circle 578 on Page 53



Four-man foundry does BIG job

The Rhude Media Co. of Marble, Minn., makes a fine iron powder for mines practicing beneficiation (reclaiming low-grade iron ore). Until recently, Rhude bought the needed iron in ingots. Now a new foundry enables the company to melt its own iron from scrap, using a Whiting #7 Cupola, U-Ladle, and Trambeam Charging System with two buckets.

The two-bucket cycle permits uninterrupted charging, assures the steady, high output needed to satisfy customers. Thanks to efficient Whiting equipment, only four men are needed in the melting department to keep the foundry operating at full blast . . . on a profitable basis.

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WHITING

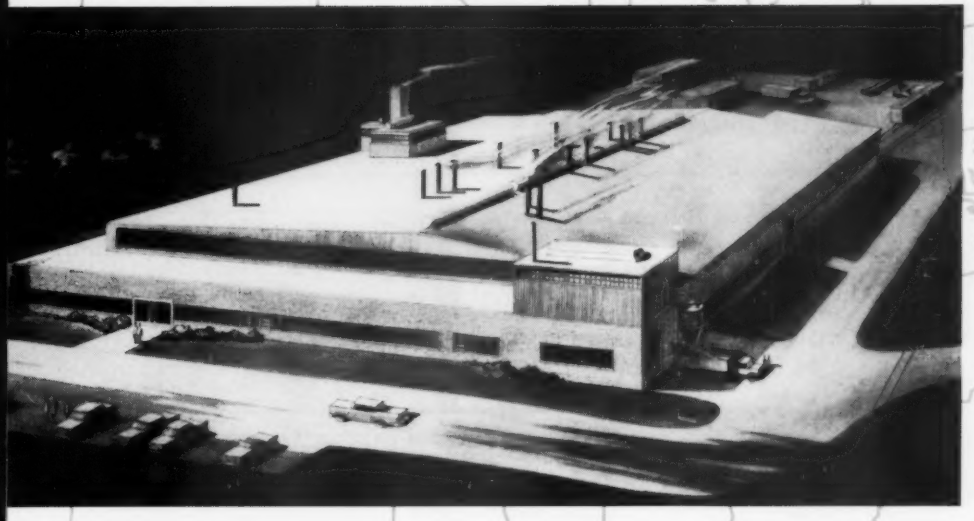
FOUNDRY EQUIPMENT

MANUFACTURERS OF CRANES; TRAMBEAM HANDLING SYSTEMS; TRACKMOBILES; FOUNDRY, RAILROAD, AND CHEMICAL PROCESSING EQUIPMENT

Circle 579 on Page 53

Now producing . . . Federated quality aluminum casting alloys from the world's most modern aluminum smelter. New convenience, faster service from the new Alton, Illinois plant and the same rigid quality controls that distinguish all Federated products. This modern smelter can produce every specification of aluminum alloy. And Federated field metallurgists back up every shipment of Alton aluminum ingot with on-the-spot assistance based on long experience. For a broad choice of aluminum casting alloys, call your nearest Federated sales office. There are 23 of them to serve you promptly. Federated Metals Division, 120 Broadway, New York 5. In Canada: Federated Metals Canada, Ltd., Toronto and Montreal.

FEDERATED METALS DIVISION OF



ASARCO

AMERICAN SMELTING AND REFINING COMPANY

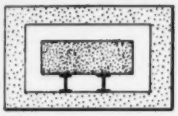
Circle 580 on Page 53

use these handy FANNER selection charts to

FACTORS TO CONSIDER IN SELECTING CHAPLETS

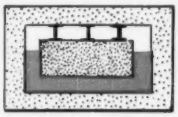
CALCULATE WEIGHT OF CORE

Purpose of chaplets in the drag side of mold is merely to hold core weight until metal is poured. Core weight = .06 lbs. per cu. Inch of Core



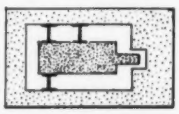
CALCULATE LIFT OF CORE

Purpose of chaplets in the cope side of mold is to withstand lift exerted by metal, which is 3.5 times the weight of the core for grey iron and 3.9 for steel. Core weight x 3.5 or 3.9 = Lift of Core



COMPENSATE FOR PRINTS AND SUPPORTS

Where prints or supports exist, load calculations should be reduced proportionately.



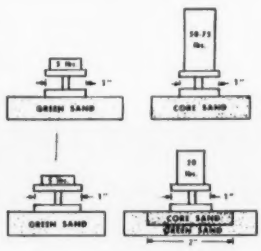
CALCULATE SUPPORTING CAPACITY OF SAND

Green sand in cope and drag will support approximately 5 lbs. per Sq. Inch. To determine required head area, divide load by 5 lbs.

$$\frac{\text{Load on Chaplet}}{5 \text{ lbs.}} = \text{Sq. Inches of Chaplet Head Area Required}$$

Baked Sand Cores will support 50 - 75 lbs. per Sq. Inch. To determine required head area (or bearing surface), divide load by 50 - 75 lbs.

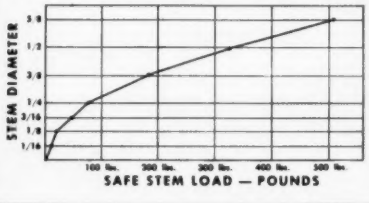
Where cores are so heavy that an excessive number of chaplets would be required, **ram-up** cores may be used to increase the bearing surface of green sand. For example: A chaplet with 1" head in green sand will support only 5 pounds. A 2" ram-up core (4 Sq. Inches) will provide a bearing surface to support 4 times 5 lbs., or 20 lbs.



CALCULATE NUMBER OF CHAPLETS REQUIRED

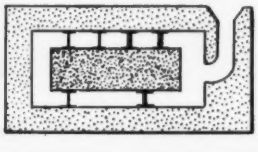
$$\frac{\text{Required Head Area (Sq. In.)}}{\text{Area of Each Chaplet Head (Sq. In.)}} = \text{Number of Chaplets Required}$$

USE THIS CHART TO CHECK SAFE LOAD ON STEMS



CONSIDER EFFECT OF LOCATION AND TEMPERATURE

When chaplet location is near the gate (heavy flow of metal), or, when steel is poured at high temperatures, allow up to 50% additional stem size to compensate for effect on chaplet.

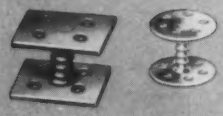
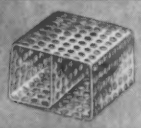
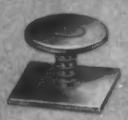
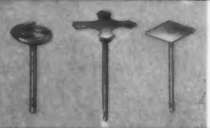
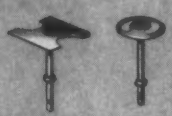


The chaplet you select for any casting can make a great difference in its quality . . . and in its overall costs. Too light or too small a chaplet may result in improper core support and a poor casting, too large or too heavy a chaplet increases chaplet costs unnecessarily. Use this graphic information to determine the correct chaplet to insure proper core support.

Write for free plastic laminated selection chart of chaplets.

insure proper selection of proper type of chaplets for your job

fine FANNER CHAPLETS are made in a wide range of types for every need

TYPE	CHARACTERISTICS	APPLICATIONS
MOTOR 	FUSE READILY STEMS CAN BE GROOVED HEADS CAN BE PERFORATED HEADS CAN BE TILTED STEMS CAN BE EXTENDED CLOSE TOLERANCES ±.002	***For Light Sections of*** Motor Blocks • Heads • Housings Radiator Sections • Burner Sections • Pump Sections • Farm Equipment • Job Castings
BUTTON HEAD OR BOILER	STURDY STRUCTURE FUSE READILY STEMS CAN BE GROOVED NON-SLIP BUTTON HEAD	***For Boiler Sections***
PERFORATED 	10 STANDARD SHAPES MADE TO FIT ALL CONTOURS MADE TO ALL RADII DESIGNED FOR WEDGES LOW IN COST	***For Light Sections of*** Stove Castings • Motor Castings • Job Castings
DOUBLE HEAD 	STURDY STRUCTURE STRONG SUPPORT TO CORE STEMS CAN BE GROOVED HEADS CAN BE CANTED RIVETED OR WELDED HEADS CLOSE TOLERANCES ±.005	***For Heavy Sections of*** Machine Tool Bases • Diesel Engines • Locomotive Frames Side Frames • Pumps • Road Machinery
SINGLE HEAD	NON-SLIP FORGED HEADS FITTED HEADS WITH ANY RADIUS SOLID SUPPORT	***For Very Heavy Cores of*** Diesel Engines • Machine Bases
RADIATOR 	UNIFORM BREAK-OFF NICKS DEEP NICKS FOR FIRM KNITTING LOW COST	***For Radiator Sections*** Burner Sections • Pump Sections Farm Equipment • Job Castings
SHOULDER RADIATOR 	EASY TO PLACE FUSE READILY DEEP BREAK-OFF NICKS STAGGERED NICKS FOR FIRM KNITTING UNIFORM SHOULDERS	***For All Thin Sections of*** Manifolds • Stove Burners Cylinder Heads

SPECIFY FANNER GROOVESTEMS TO ELIMINATE LEAKERS

Your best insurance against faulty castings is the GROOVESTEM chaplet with the Countersunk Shoulders, Featheredge Fusion Rings, and Complete Contact Radius Grooves.

When you need chaplets remember that only FANNER makes a complete line for every casting requirement. Regardless of the kind of metal you pour or the type of casting you produce, you can secure the exact chaplet you need from this one source. As a result you always save time . . . reduce costs . . . step-up production when you standardize on FANNER for all your needs.

THE **FANNER** MANUFACTURING COMPANY

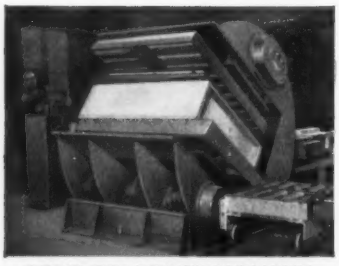
Designers and Manufacturers of Fine Fanner Chaplets and Chills

BROOKSIDE PARK CLEVELAND 9, OHIO

Circle 581 on Page 53

Greenlee Core Machines in Greenlee Foundry

Foundrymen: Mechanize your Core Line Production with GREENLEE Core Rollover and Draw Machines



CORE ROLLOVER MACHINE
Clamp, rollover and roll back cycle time is 45 seconds.

CORE DRAW MACHINE
Positions, clamps, vibrates, draws core boxes to 32" deep in 80 seconds.

. . . Increase daily core production
. . . Reduce box and core damage
. . . Permit use of lighter, less expensive core boxes

Greenlee Core Rollover and Draw Machines pay large dividends in high speed, economical core line production. These machines are capable of handling 50 cores per hour. Compare your present method with this production time! Greenlee Core Rollover and Draw Machines provide the flexibility needed for large and small core production.

Standardization of core box sizes is unnecessary . . . use your present boxes. Lighter, inexpensive core boxes can be used because hammering, crane handling and log chain damage is eliminated. Greenlee Core Machines can help you produce better cores faster, more economically.

WRITE FOR BULLETIN F-101 — YOU'LL GET COMPLETE DETAILS ON GREENLEE CORE MACHINES

Machines designed with the future in mind.

GREENLEE BROS. & CO.

1700 MASON AVE.
ROCKFORD, ILLINOIS

Circle 582 on Page 53

Lowest blast cleaning cost ever with

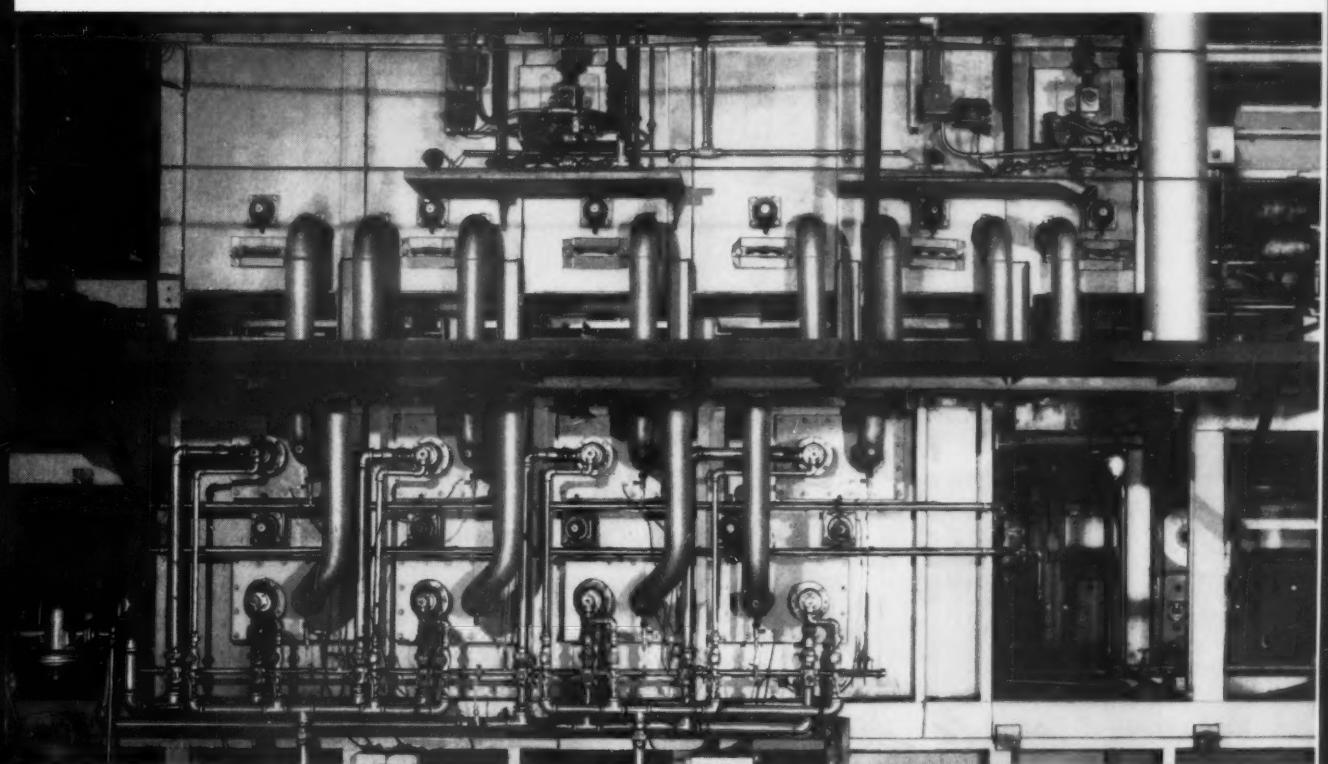
ROTOBLAST® STEEL SHOT

✓ Vacuum Casting

Electric furnace alloy steel, for the first time shotted in revolutionary vacuum chamber for greater density, eliminating voids and defects. You get a fatigue resisting shot for better, faster cleaning.

✓ Continuous Heat Treating in Controlled Atmosphere

Uniform heating for every particle, in controlled atmosphere (zero oxygen), gives you ball bearing, heat treating quality for uniform hardness and longer wear life.



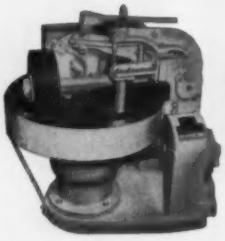
This is one of the new Rotoblast Unit Line Furnaces, the first of their type, with which Pangborn is bringing a new concept of quality to the steel abrasive industry.

Pangborn

See for yourself! Call the Pangborn Engineer in your area or write PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

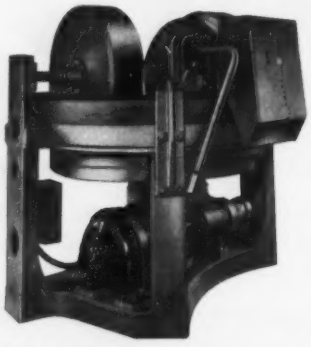
Rotoblast® Steel Shot

Circle 583 on Page 53

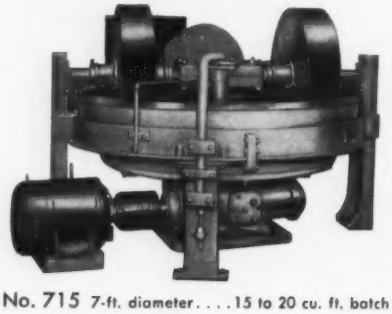


No. 251 2½-ft. diameter . . . . ½ to 1 cu. ft. batch

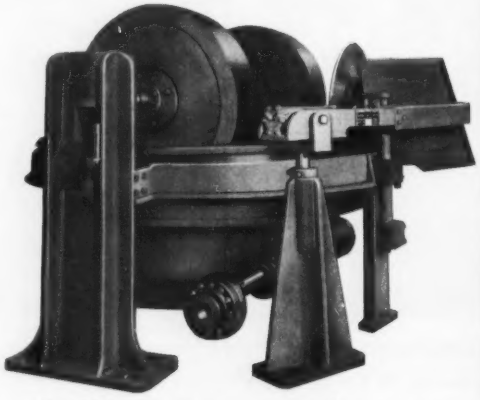
No. 414 4-ft. diameter . . . . . 2 to 4 cu. ft. batch



No. 610 6-ft. diameter. . . . 10 to 14 cu. ft. batch



No. 715 7-ft. diameter. . . . 15 to 20 cu. ft. batch



No. 930 9-ft. diameter. . . . 30 to 40 cu. ft. batch

ANY SIZE MADE TO YOUR SPECIFICATIONS

From compact portables to heavy-duty mullers

CLEARFIELD CAN SUPPLY THE RIGHT MIXER FOR YOUR JOB

Clearfield Mixers are available in capacities ranging from ½ to 40 cu. ft. . . . for batch or continuous mixing. They're constructed of rugged cast iron for strength, rigidity and wear resistance. And all Clearfield mixers feature the "revolving pan" mixing principle which keeps the material in *constant* state of violent motion; this eliminates the "lag" intervals which result in mixers with mullers and scrapers that revolve instead of the pan. With Clearfield revolving-pan mixers you get a constant controlled-course mixing action which assures a better balance of blending and tempering.

Whether you need a mixer for maintaining proper bond and moisture in heap sands . . . preparing facing sand or core sand for castings . . . or for any foundry application where sand control is important . . . Clearfield Mixers can do the job better, and save you production money.

Let us help you determine the best type and size for your particular needs. No obligation. Meanwhile, send for Catalog No. 90.

CLEARFIELD MACHINE COMPANY

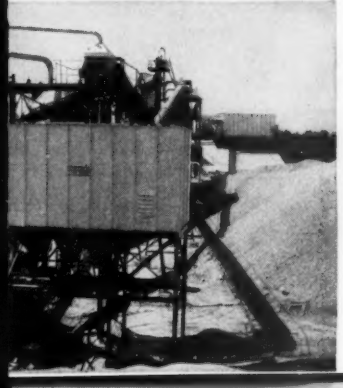
CLEARFIELD, PENNSYLVANIA, U.S.A.

Circle 584 on Page 53

Circle 583 on Page 53

Walkway to efficient dust control

Pangborn Cloth Bag Dust Collector on the job. This is just one of Pangborn's complete line of wet and dry dust collectors.



See those bags? They're the *collect* in the Pangborn Cloth Bag Dust Collector. And they're efficient! The cloth filter has proved the most practical method for collecting finely divided dry dusts. But Pangborn goes a step further. Pangborn engineering has not only adapted this design to increase its collecting effectiveness but has simplified its construction. This means you save money. The Pangborn Cloth Bag Collector offers maximum efficiency, yet is economical to buy, install and operate.

Pangborn engineering is important to every dust-producing plant, regardless of the kind of collector needed. It is not enough to put a dust collector within a plant. An efficient dust collecting system must be *scientifically* planned, designed and constructed to handle effectively a specific dust problem. This thinking is incorporated into every Pangborn proposal.

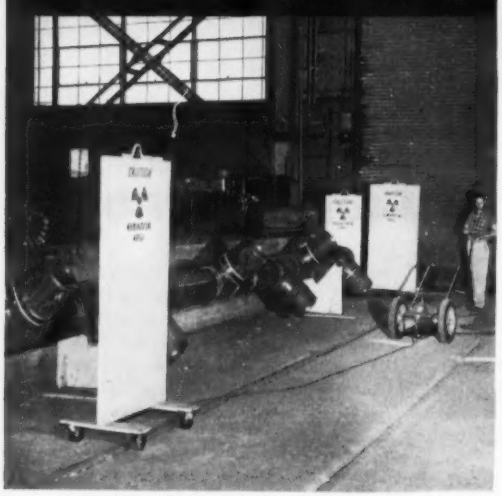
The Pangborn Engineer in your area will be glad to go to work for you. He is a dust expert *and will discuss your individual problem at no obligation. And, for more information, write for Bulletin 922 to:* Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md. Manufacturers of Dust Control and Blast Cleaning Equipment.*

Pangborn CONTROLS DUST

Circle 585 on Page 53

COMPLETING THE PICTURE...

Nuclear Systems Economical, Portable Radiography Machines



MODEL 52 MULTITRON...handling several sources for varying requirements.

"We save approximately 50% of radiography costs on welding inspection by using Nuclear Systems Equipment," said the Manager of Manufacturing at the Chattanooga, Tennessee plant of Combustion Engineering, Inc., last year when Nuclear Systems gamma radiography machines were in use many hours a day. *Now* these machines are used around the clock—and savings over the use of conventional X-ray equipment have increased proportionately. Without expensive rigging, high quality radiographs are being obtained wherever and whenever needed—on almost all sizes and shapes of welded vessels and components.

There's a Nuclear Systems radiography machine which can tighten up your quality control . . . ease up your budget. For full information, write any of our sales offices.

PHILADELPHIA • CHICAGO • SAN FRANCISCO

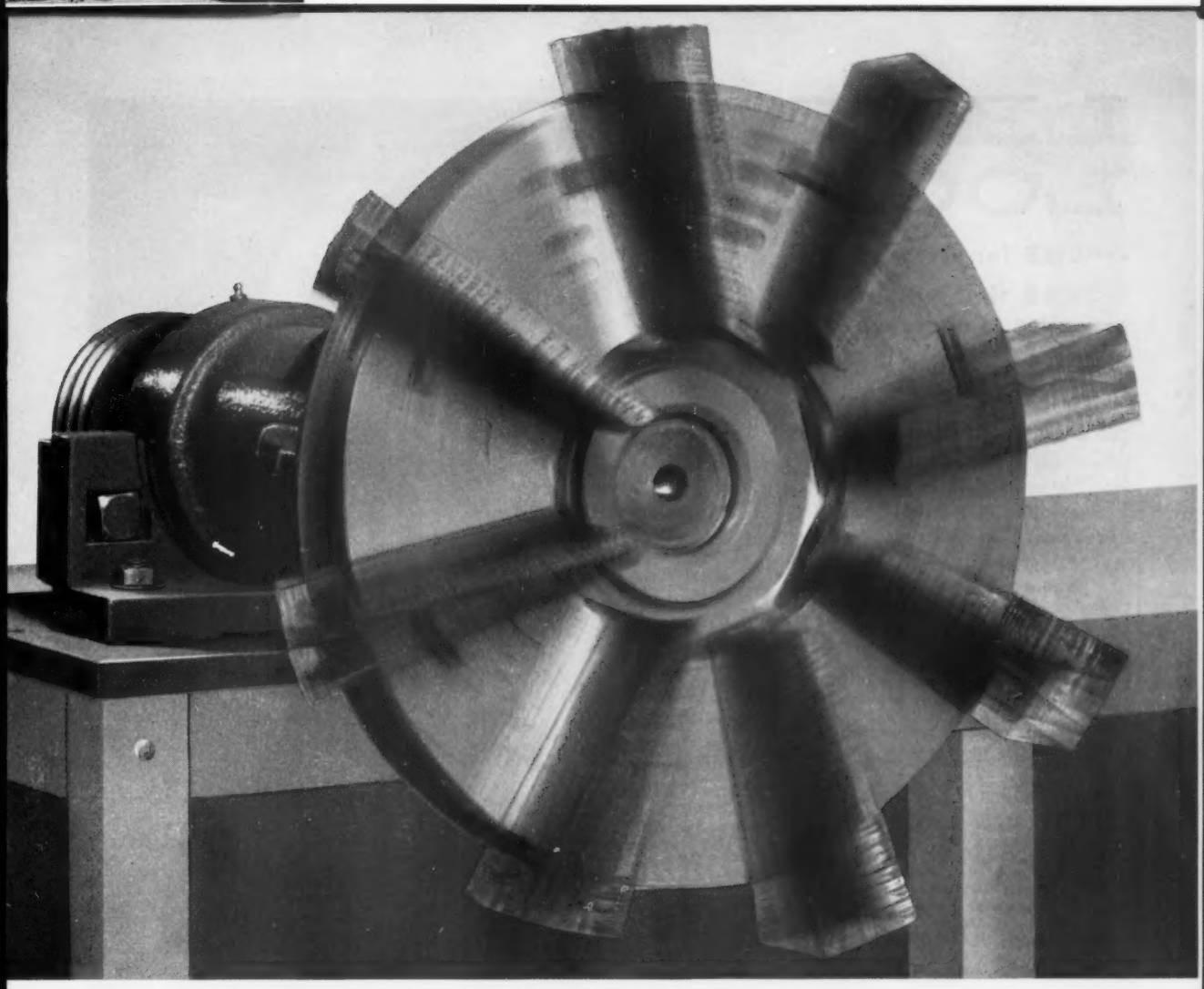
NUCLEAR SYSTEMS

A DIVISION OF THE BUDD COMPANY, Philadelphia 32, Pa.

Budd

Circle 586 on Page 53

Circle 585 on Page 53



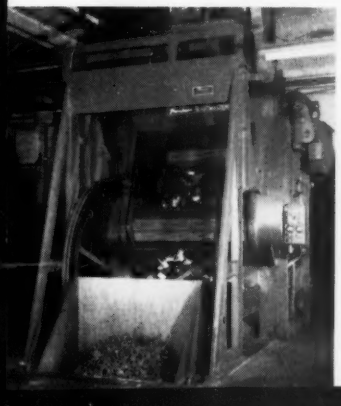
"Rotoblasting" a profit pattern

Pangborn Rotoblast Wheel gives you minimum blast cleaning costs.

This cutaway view of power-in-motion spells *efficiency* . . . the efficiency of Pangborn Blast Cleaning Machines.

The Pangborn-developed central impellor design makes possible high abrasive discharging capacity at high efficiency. Up to 160,000 lbs. of abrasive an hour can be efficiently handled by these Rotoblast Wheels. Service ease and reliability are assured by Pangborn vane locking design. Permanent factory alignment of running parts and bearings, plus the lubrication system, permit wheel spindle mounting at any angle. It is this kind of engineering—whichever size Rotoblast Wheel *your* Blast Cleaning Machine needs—that lowers cost by giving you maximum production with a minimum of maintenance.

Pangborn Blast Cleaning Barrel—one of a complete line of Pangborn machines utilizing the cost-cutting principle of Rotoblast cleaning.



The Pangborn Engineer in your area will be glad to go to work on your cleaning problem at no obligation. And for complete information on Pangborn Rotoblast Wheels, write to Pangborn Corp., *1400 Pangborn Blvd., Hagerstown, Md., Manufacturers of Blast Cleaning and Dust Control Equipment.*

Pangborn cleans it fast with ROTOBLAST®

Circle 587 on Page 53

LET'S LOOK at

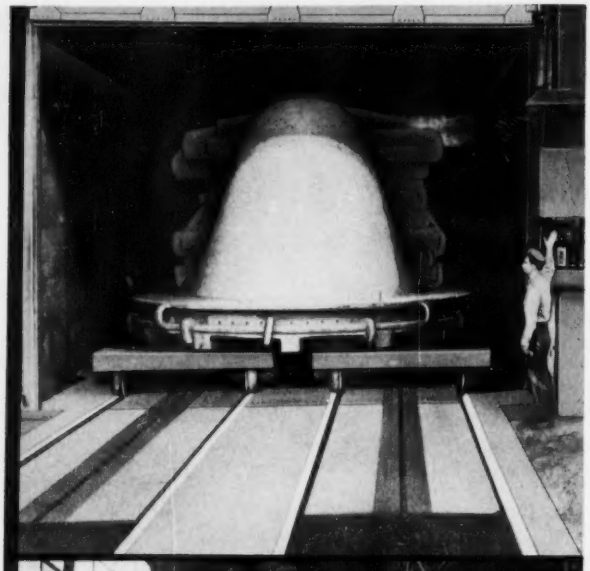
OVENS for every baking requirement

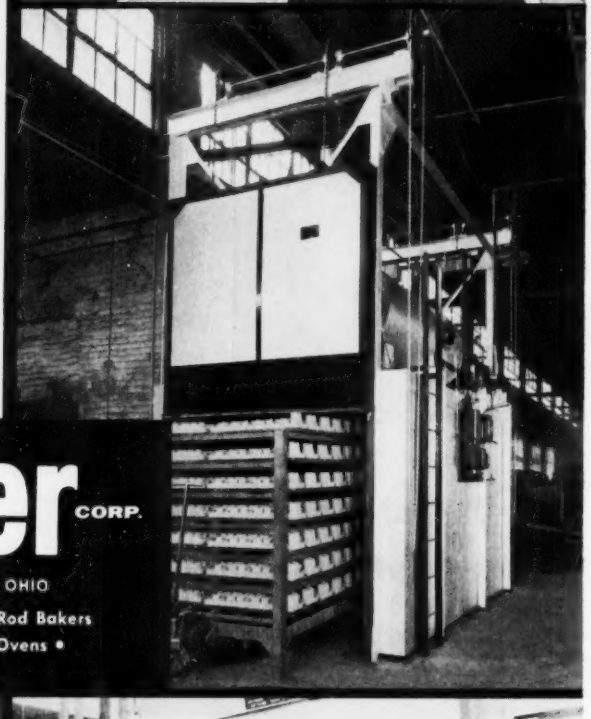
OVENS that will be faster and less expensive to operate

OVENS that are designed to best fit your operation

Carl Mayer designs and manufactures all types of ovens as well as "specials" to meet unusual operating conditions. Most incorporate the Carl Mayer recirculating heating system with sealed combustion chamber that keeps gases from prematurely escaping into the load area. Cores and molds are baked evenly with no burning. Temperatures are always under control.

Write for Bulletin 53-CM





TOP RIGHT—This large car type mold oven is installed at Pittsburgh Steel Foundry. Its special triple slotted panel construction reduces heat loss 1/3. Fuel savings up to 50% over old conventional methods are possible. Drying time is often cut in half and temperatures are uniformly controlled.

MIDDLE RIGHT—This rack type core baking oven is at the Fremont Foundry Co., Fremont, Ohio. It is equipped with a recirculating combination gas-oil fired heating system.

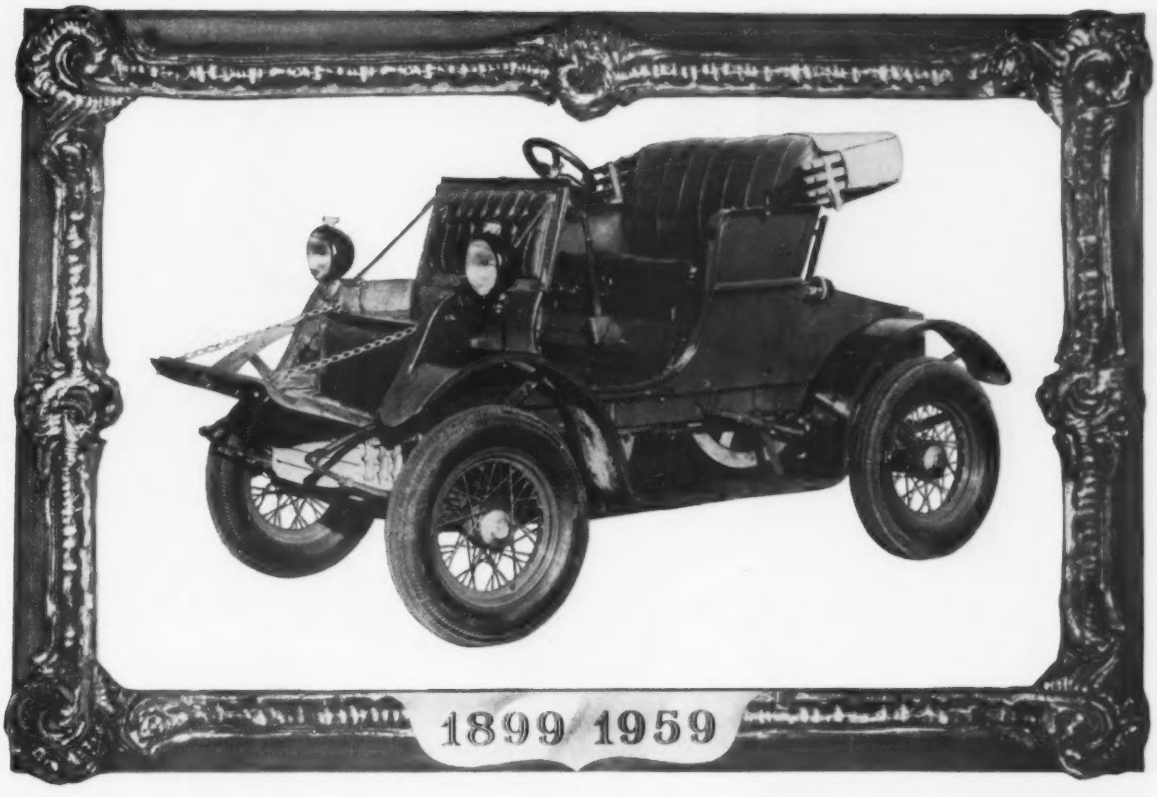
BOTTOM RIGHT—Vertical Core Oven (unloading position) at A. C. Williams Company, Ravenna, Ohio. This oven is 11'-0" wide x 11'0" deep x 45'-0" high.

BELOW—Our standard rolling drawer type core baking oven. The heating equipment (not shown) may be mounted on floor beside unit or on the roof. Particularly adaptable to brass and aluminum foundries.

THE **carl mayer** CORP.

20800 CENTER RIDGE ROAD CLEVELAND 16, OHIO

OTHER PRODUCTS: Heat Treating Ovens and Furnaces • Rod Bakers • Welding Rod Ovens • Paint and Ceramic Drying Ovens • Special Processing Equipment and Accessories



Everything's changed but the trademark on the bearings

BUILT by the St. Louis Motor Car Co. in 1899, this car was the first equipped with Timken® tapered roller bearings. It's still running. And today every make of American car but one uses Timken bearings. The things that the trademark "Timken" stands for haven't changed. It still means the highest quality, the best-known name in bearings, and the kind of service you can't get anywhere else. It means better performance with longer life and less maintenance in machine tools, steel mills, heavy construction machinery, farm implements and tractors —wherever wheels and shafts turn.

"Timken" is a registered trademark that identifies all products of The Timken Roller Bearing Company—tapered roller bearings, fine alloy steel bars, seamless steel tubing and removable rock bits.

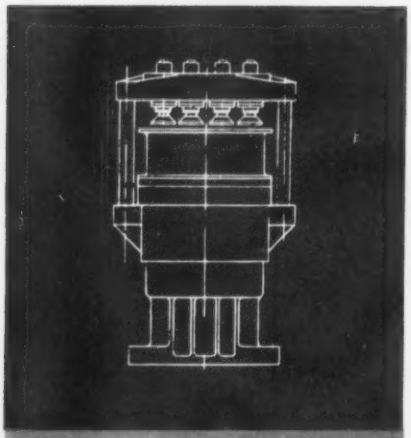
It's to your advantage to remember that "Timken" is not a type of product. It's your assurance of the best in tapered roller bearings, fine alloy steels and removable rock bits. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable: "TIMROSCO".

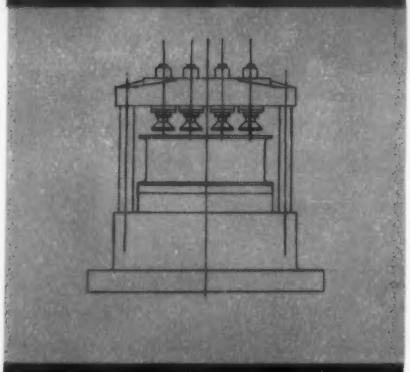
TAPERED ROLLER BEARINGS • REMOVABLE ROCK BITS • FINE ALLOY STEEL

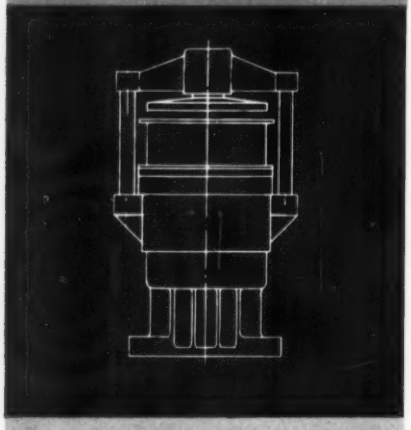
TIMKEN®

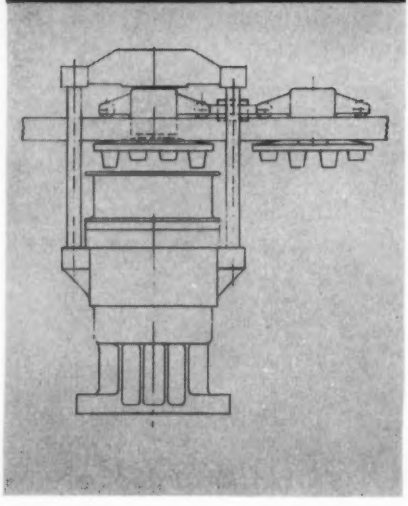
first in quality for 60 years

Circle 589 on Page 53









a type and size molding machine for every foundry operation . . . .

A long-standing, progressive policy here at the Herman Company has resulted in the continuous development of new and better molding machines.

Our complete line now includes *15 different types* to meet the demands of modern foundry operations.

One outstanding end product stemming from our drawing boards is the MOLDMASTER.

This revolutionary Herman machine was designed to meet the normal molding requirements of most foundries.

The Moldmaster, a jolt, squeeze, strip machine, operates by automatic, semi-automatic or push-button controls.

It offers pattern contour mold compacting which results in maximum versatility for all types of molding.

A self-adjusting squeeze head attached to the jolt machine, table flows the sand in such a manner that perfect molds are insured. The machine accommodates itself readily to four different molding methods, depending on your requirements.

The Moldmaster typifies our research into better ways to build better molding machines to better the industry.

We have detailed literature available on the Moldmaster, as well as the complete Herman line. Yours for the asking.

HERMAN PNEUMATIC MACHINE CO.

UNION BANK BUILDING, PITTSBURGH 22, PA.

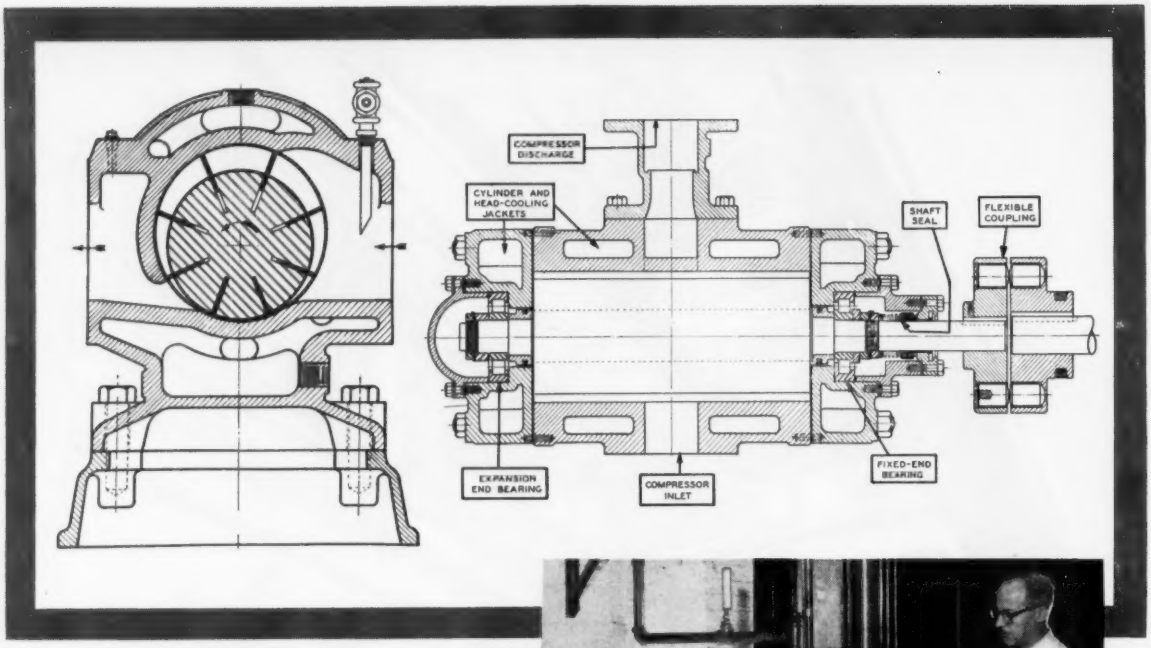
HERMAN

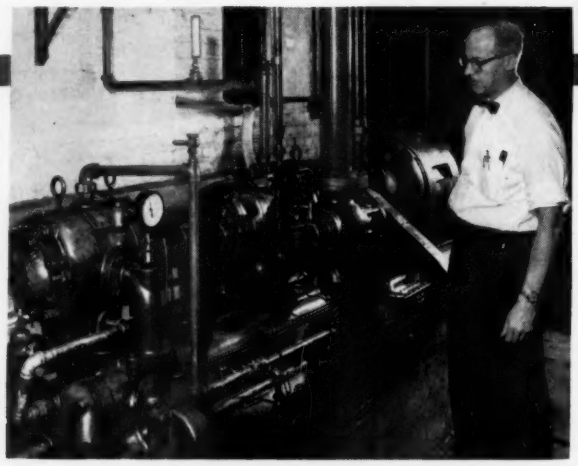
FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

and most progressive

Best Known Name in Engineered Molding Machines

Circle 590 on Page 53





Hard service never affected this Fuller rotary's original output—230 cfm. of air at 90 lb. G., reports Mr. Schott, chief engineer, Thomas C.Wilson, Inc., Long Island City, N.Y.

FULLER ROTARY COMPRESSOR RUNS 13 YEARS WITHOUT DOWNTIME

A Fuller rotary at Thomas C. Wilson, Inc. got its first maintenance shutdown recently, for renewal of roller bearings and rotor vanes—after running without downtime since 1945.

4 years of 24-hour service. The Wilson plant makes tube cleaning equipment, tube expanders and portable pneumatic tools, and so makes heavy daily demands on shop air. For the first four years, three-shift operation kept the Fuller rotary running round the clock. Since 1949, it's been working eight-hour shifts.

Simple design means trouble-free service. Besides bearings, the only moving parts in a Fuller vane-type rotary compressor are the cylinderical rotor and the blades. These compensate for wear automatically. Cylinder head slips off, permitting blade and bearing inspection in a matter of minutes.

Compact and vibration-free. Direct-drive system saves space. Simple, rugged design gives constant service without extensive supervision. Thus, Fuller rotaries can be installed out-of-the-way—on upper floor, on balconies, in basement corners, using low-cost, light-weight foundations.

1189
C-340

Write today for detailed information on the full line of Fuller rotary compressors for in-plant services, gas gathering, and industrial refrigeration.

FULLER COMPANY GENERAL AMERICAN TRADE MARK

FULLER COMPANY
148 Bridge St., Catasauqua, Pa.
SUBSIDIARY OF GENERAL AMERICAN TRANSPORTATION CORPORATION
Birmingham • Chicago • Kansas City • Los Angeles • New York • San Francisco • Seattle

Fuller
....pioneers in harnessing AIR

PIONEERS OF HIGH-EFFICIENCY VANE TYPE ROTARY COMPRESSORS SINCE 1930

Use These Cards . . .

FOUNDRY

- For more information on anything advertised in this issue
- For further data on products described in the Equipment and Supplies section (Page 105)
- To get copies of publications listed in the Literature for Foundrymen section (Page 142)
- To request extra copies of editorial articles

FOUNDRY — February 1959

401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
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410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
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412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
420	450	480	510	540	570	600	630	660	690	720	750	780	810	840	870
421	451	481	511	541	571	601	631	661	691	721	751	781	811	841	871
422	452	482	512	542	572	602	632	662	692	722	752	782	812	842	872
423	453	483	513	543	573	603	633	663	693	723	753	783	813	843	873
424	454	484	514	544	574	604	634	664	694	724	754	784	814	844	874
425	455	485	515	545	575	605	635	665	695	725	755	785	815	845	875
426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
427	457	487	517	547	577	607	637	667	697	727	757	787	817	847	877
428	458	488	518	548	578	608	638	668	698	728	758	788	818	848	878
429	459	489	519	549	579	609	639	669	699	729	759	789	819	849	879
430	460	490	520	550	580	610	640	670	700	730	760	790	820	850	880

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401	431	461	491	521	551	581	611	641	671	701	731	761	791	821	851
402	432	462	492	522	552	582	612	642	672	702	732	762	792	822	852
403	433	463	493	523	553	583	613	643	673	703	733	763	793	823	853
404	434	464	494	524	554	584	614	644	674	704	734	764	794	824	854
405	435	465	495	525	555	585	615	645	675	705	735	765	795	825	855
406	436	466	496	526	556	586	616	646	676	706	736	766	796	826	856
407	437	467	497	527	557	587	617	647	677	707	737	767	797	827	857
408	438	468	498	528	558	588	618	648	678	708	738	768	798	828	858
409	439	469	499	529	559	589	619	649	679	709	739	769	799	829	859
410	440	470	500	530	560	590	620	650	680	710	740	770	800	830	860
411	441	471	501	531	561	591	621	651	681	711	741	771	801	831	861
412	442	472	502	532	562	592	622	652	682	712	742	772	802	832	862
413	443	473	503	533	563	593	623	653	683	713	743	773	803	833	863
414	444	474	504	534	564	594	624	654	684	714	744	774	804	834	864
415	445	475	505	535	565	595	625	655	685	715	745	775	805	835	865
416	446	476	506	536	566	596	626	656	686	716	746	776	806	836	866
417	447	477	507	537	567	597	627	657	687	717	747	777	807	837	867
418	448	478	508	538	568	598	628	658	688	718	748	778	808	838	868
419	449	479	509	539	569	599	629	659	689	719	749	779	809	839	869
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426	456	486	516	546	576	606	636	666	696	726	756	786	816	846	876
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FOUNDRY

Reader Information Service

Just mail one of these cards . . . for more information on anything advertised in this issue . . . for further data on products described in the Equipment and Supplies section (Page 105) . . . to get copies of publications listed in the Literature for Foundrymen section (Page 142) . . . to request extra copies of editorial articles

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BUSINESS REPLY MAIL
No Postage Stamp Necessary If Mailed in the United States

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Silicon, a single element essential in cast iron, is available to the foundry trade in many varied ferro alloys. No single ferrosilicon is right for all melting conditions and irons. Rather, specific alloys have been developed which are tailored to provide maximum economy and effectiveness for specific applications.

Our brochure, "Silicon in Cast Iron" discusses the function of silicon in iron and will serve as a guide to the selection of the proper grade of ferrosilicon for your cupola or ladle needs.

Circle 592 on Page 53

Write for your copy or contact our nearest sales office.

QUALITY · DEPENDABILITY · SERVICE

Ohio Ferro-Alloys Corporation
Canton, Ohio

DISTRICT SALES OFFICES: BIRMINGHAM, CHICAGO, DENVER, DETROIT, HOUSTON, LOS ANGELES, MINNEAPOLIS, PHILADELPHIA, PITTSBURGH, SAN FRANCISCO, SEATTLE

On the pouring floor of the No. 2 Foundry Unit at Sparta, twenty conveyor lines are poured by 3 ladles

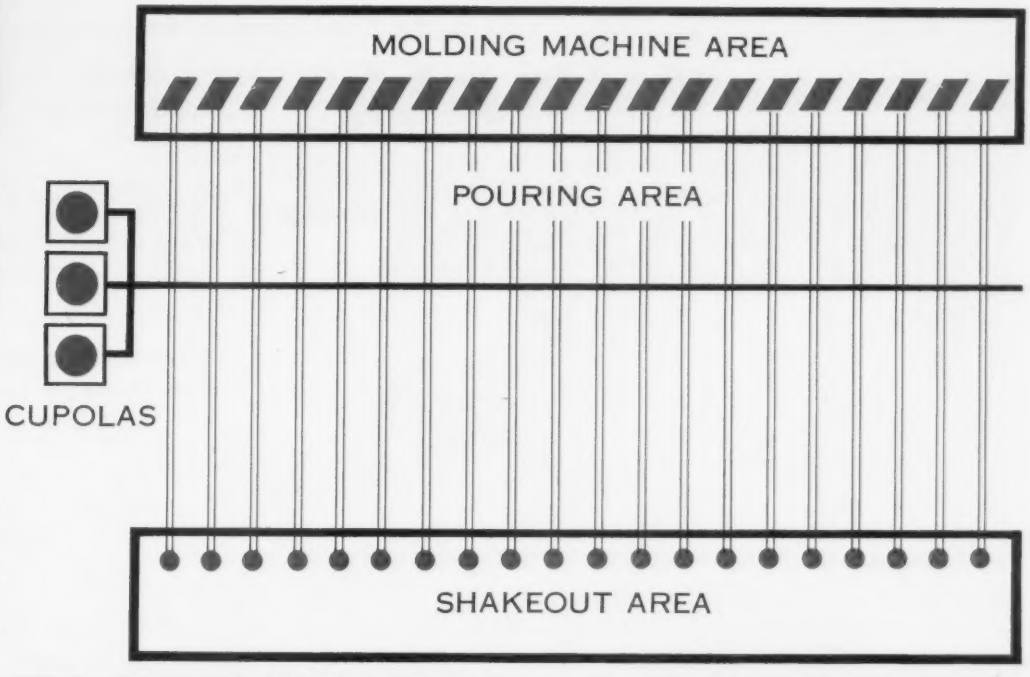
At Sparta Foundry—1 million piston rings a day prove the quality of HANNA PIG IRON

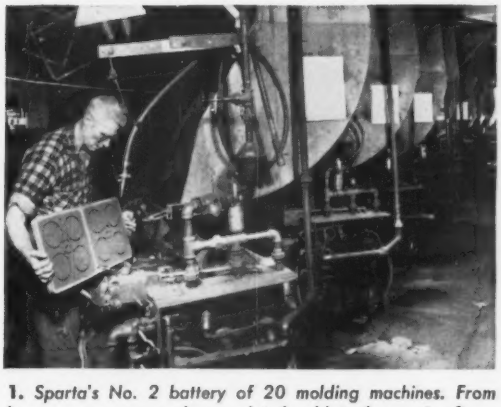
Sparta Foundry Company, a division of Muskegon Piston Ring Company, in Sparta, Michigan, can cast up to 1,000,000 piston rings in a single day. Since 1926, it has produced over three billion rings. In castings for piston rings, which will be ground to a close tolerance, Sparta Foundry demands a strong, fine-grained iron with uniform microstructure. For pig iron sure to produce this quality, Sparta Foundry has relied on Hanna for more than 30 years.

Hanna makes all regular grades of pig iron, plus HannaTite and Hanna Silvery. All are available in two sizes—the 38-pound pig and the smaller HannaTen ingot. Your Hanna representative will be glad to tell you more about the advantages of using Hanna pig iron.

Sparta's operation accents both quality and quantity

This flow chart shows the multiplicity of Sparta's continuous production lines. Twenty molding machines, twenty continuous conveyors, and multiple shakeout stations are part of the operation.

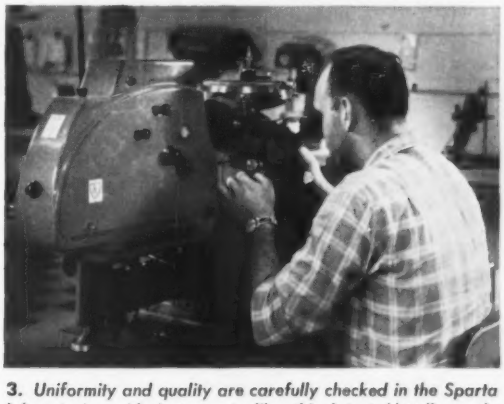




1. *Sparta's No. 2 battery of 20 molding machines. From here, conveyors carry the completed molds to the pouring floor.*

2. *From pouring floor, conveyors take castings to shakeout. After shakeout, piston rings are removed from the "tree."*

THE HANNA FURNACE CORPORATION
Buffalo • Detroit • New York • Philadelphia
Merchant Pig Iron Division of
NATIONAL STEEL CORPORATION



3. *Uniformity and quality are carefully checked in the Sparta laboratories with instruments like this latest Metallograph.*

Circle 593 on Page 53

re: coating your own sand

ARE YOU PAYING FOR EQUIPMENT YOU DON'T HAVE?

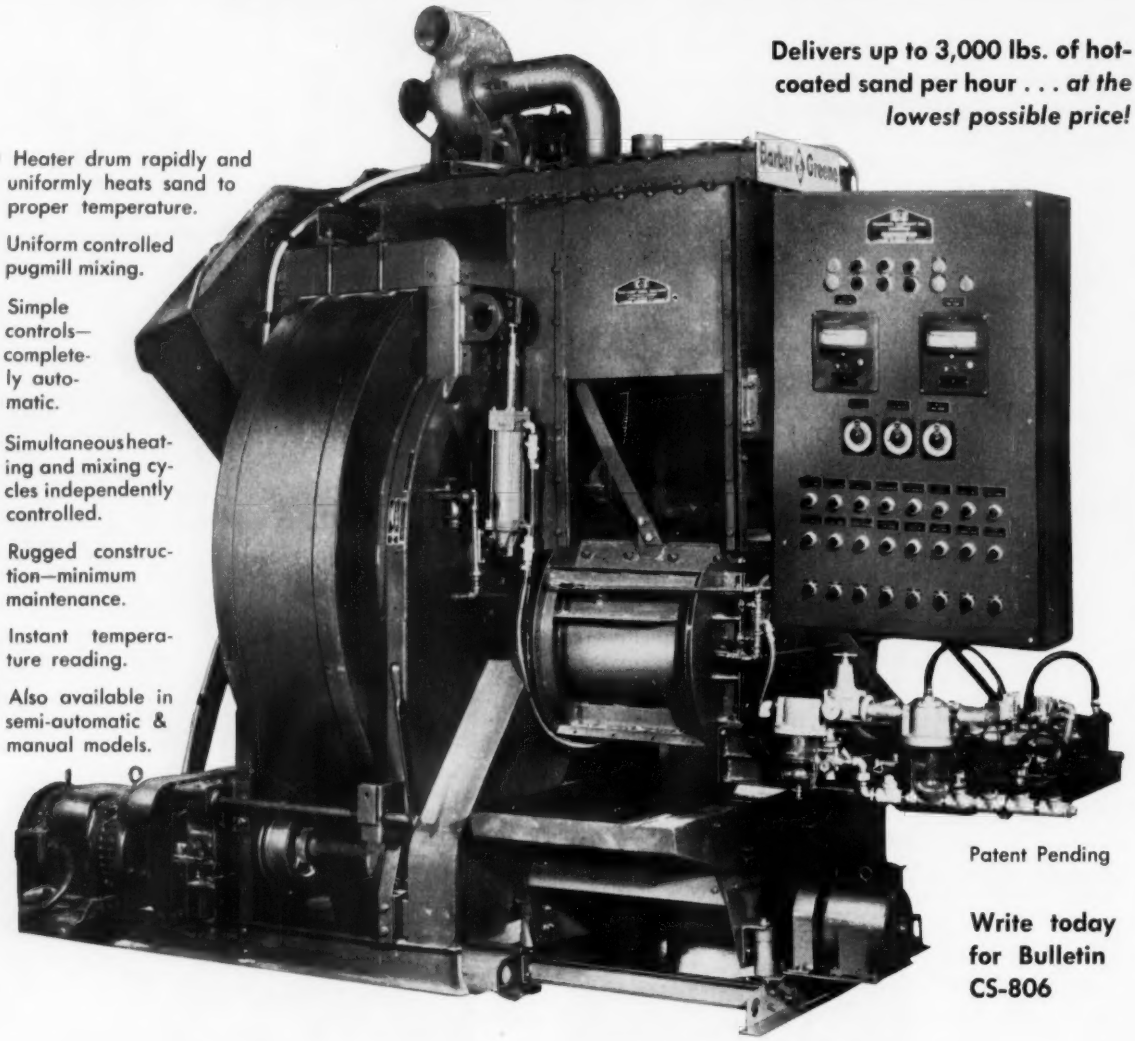
Old Equipment can be costing you more than enough to own the

Automatic "MIXALL" SHELL-SAND COATING UNIT

SAND (WET OR DRY) + **HEAT** + **RESIN** (LIQUID OR LUMP) —"HEXA"→ **COATED SAND** (FREE FLOWING — LUMP FREE)

Delivers up to 3,000 lbs. of hot-coated sand per hour . . . *at the lowest possible price!*

- Heater drum rapidly and uniformly heats sand to proper temperature.
- Uniform controlled pugmill mixing.
- Simple controls—completely automatic.
- Simultaneous heating and mixing cycles independently controlled.
- Rugged construction—minimum maintenance.
- Instant temperature reading.
- Also available in semi-automatic & manual models.



Patent Pending

Write today for Bulletin CS-806

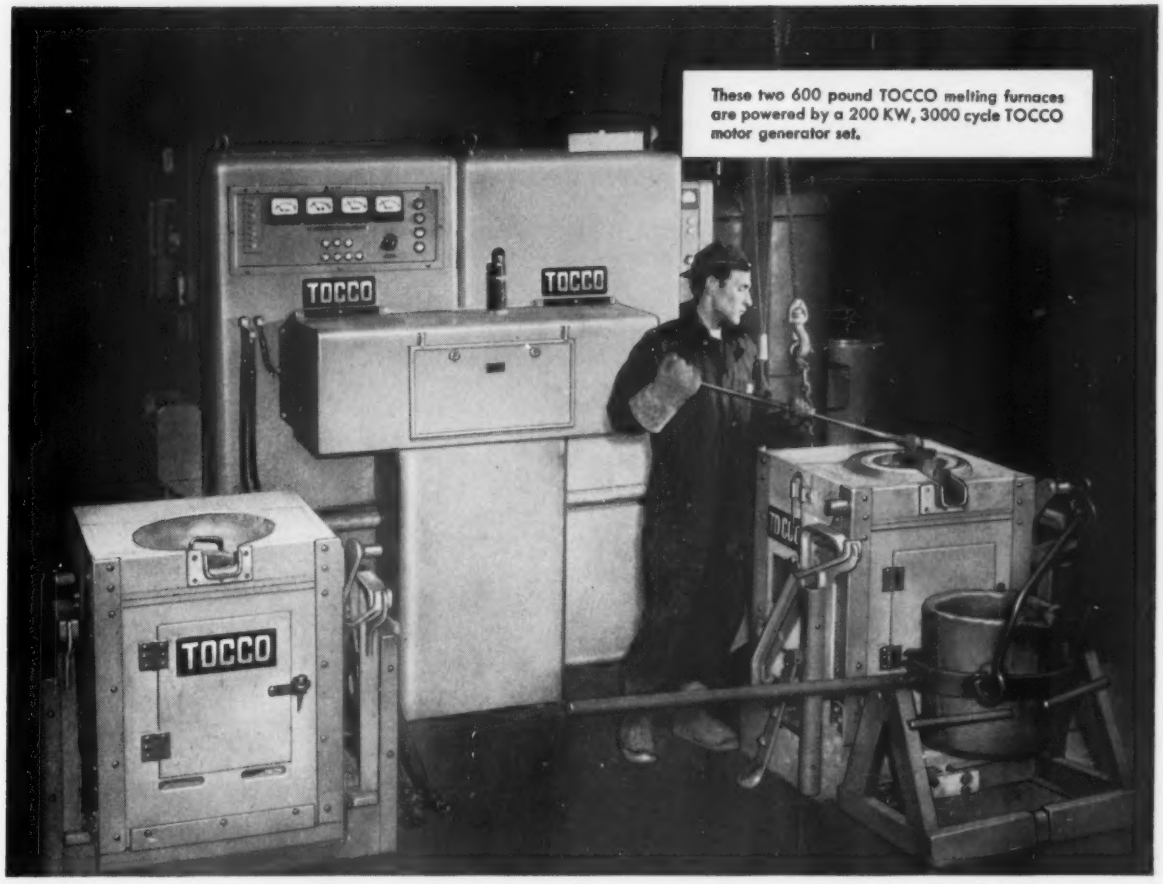
Constant Quality Through Constant Control

C&S PRODUCTS CO., INC.

18656 FITZPATRICK
DETROIT 28, MICHIGAN

Affiliated with Barber-Greene

Circle 594 on Page 53



These two 600 pound TOCCO melting furnaces are powered by a 200 KW, 3000 cycle TOCCO motor generator set.

TOCCO* Induction Melting "Delivers"— In Two Days Instead of Two Months!

Casting backlogs at Commercial Shearing and Stamping Co. in Youngstown, Ohio, used to lag from 8 to 10 weeks behind production schedules. By installing four 300 pound TOCCO melting furnaces this firm upped daily melting capacity to 16,000 pounds. Now orders can be shipped in 48 to 72 hours.

In a foundry occupying less than 5,000 square feet of space, production of castings jumped between 40% and 50%; tensile strength of alloy castings was boosted from 35,000 to 50,000 p.s.i. Substantial savings in the cost of castings have resulted. Moreover, with precision casting and molding on a push button basis, many former drilling and roughing operations were completely eliminated.

Many firms have discovered that TOCCO Induction Melting insures maximum quality control, increased volume and lower operating costs.

Look to TOCCO also for *vacuum* melting furnaces of up to *5,000 pounds* capacity.

THE OHIO CRANKSHAFT COMPANY

TOCCO

*Trade Mark Reg. U. S. Pat. Off

Mail Coupon Today

NEW FREE BULLETIN

THE OHIO CRANKSHAFT CO.
Dept. F-2, Cleveland 5, Ohio

Please send copy of "The Case for TOCCO Induction Melting."

Name_____

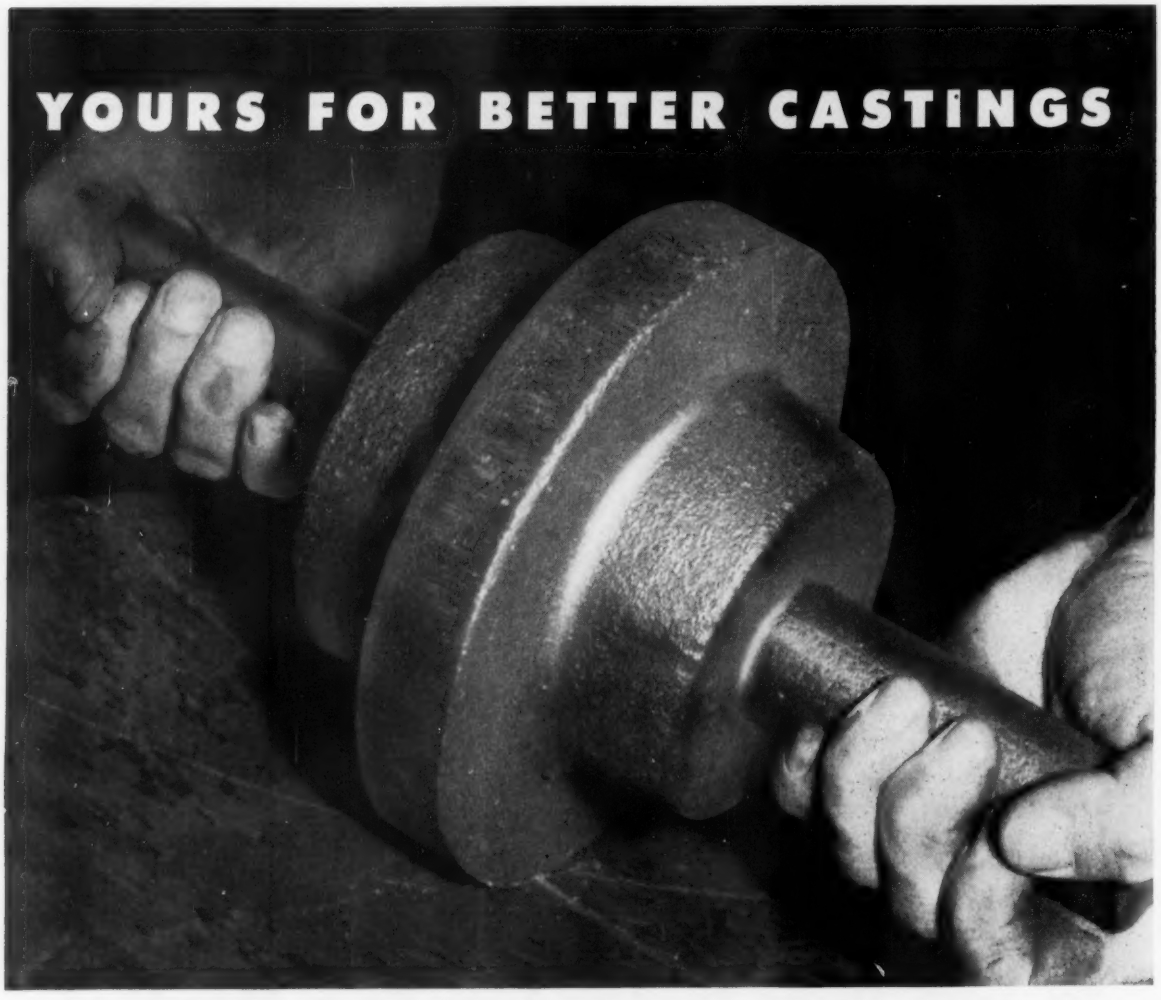
Position_____

Company_____

Address_____

City_____ Zone____ State____

Circle 595 on Page 53



OTTAWA

SILICA SANDS

THE WORLD'S FINEST SILICA SAND

99.89% PURE

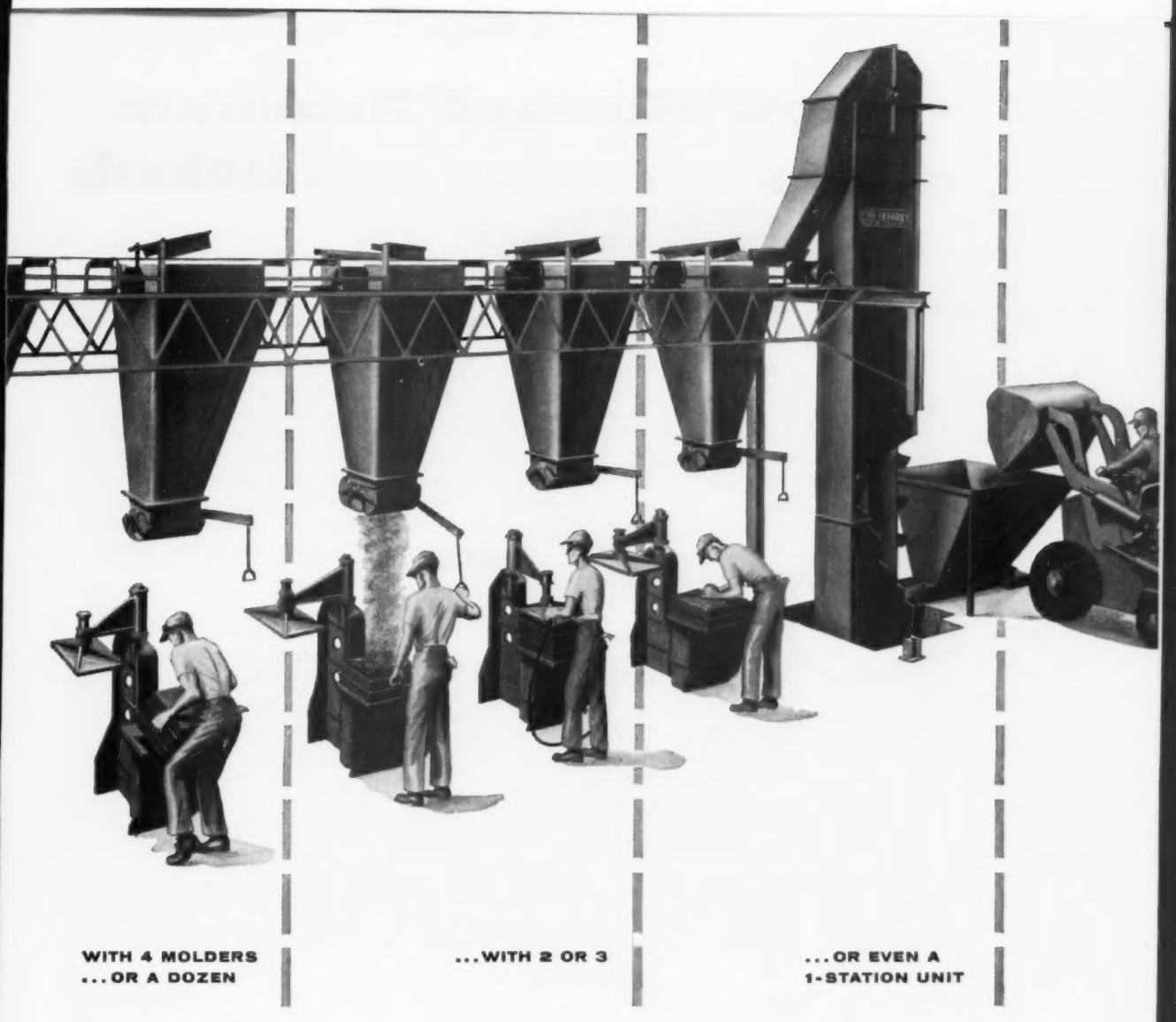
Laboratory tests prove Ottawa Silica 99.89% pure.

OTTAWA SILICA COMPANY

PLANTS LOCATED IN OTTAWA, ILL. AND ROCKWOOD, MICH.

Serviced by two main trunk railway systems, Ottawa offers fast delivery to all corners of the nation.

SERVING THE FOUNDRY, GLASS AND CERAMIC INDUSTRIES FOR OVER 50 YEARS



WITH 4 MOLDERS
...OR A DOZEN

...WITH 2 OR 3

...OR EVEN A
1-STATION UNIT

Speeds production...cuts molding costs

JEFFREY OVERHEAD SAND SYSTEM

Here's automation which can be *profitably* applied to small foundries as well as big ones . . . the low-cost, easy-to-install Jeffrey overhead sand system. Whether you have a single molding station or a dozen, it will speed production and reduce your molding costs.

Sand is always available at the molding machine and it doesn't have to be lifted from the floor. Molders' time is saved, their work made easier when sand flows directly from overhead hoppers into the flasks.

These Jeffrey overhead sand units were designed to bring big-foundry advantages to small foundries . . . at low cost. Built as package units, savings in engineering and manufacturing costs are passed along to you. For complete information, get in touch with The Jeffrey Manufacturing Company, 907 North Fourth Street, Columbus 16, Ohio.

JEFFREY

CONVEYING • PROCESSING • MINING
EQUIPMENT...TRANSMISSION MACHINERY
...CONTRACT MANUFACTURING

Circle 597 on Page 53

How Howard Beacham licked

Howard Beacham has been a Bay State Abrasive Engineer for fifteen years and his total experience is double that. He's worked on grinding problems that have involved every type of metal in jobs as tiny as miniature bearings and as big as the world's largest air compressors and steam turbines.

a king-size cut-off problem at Black-Clawson . . .

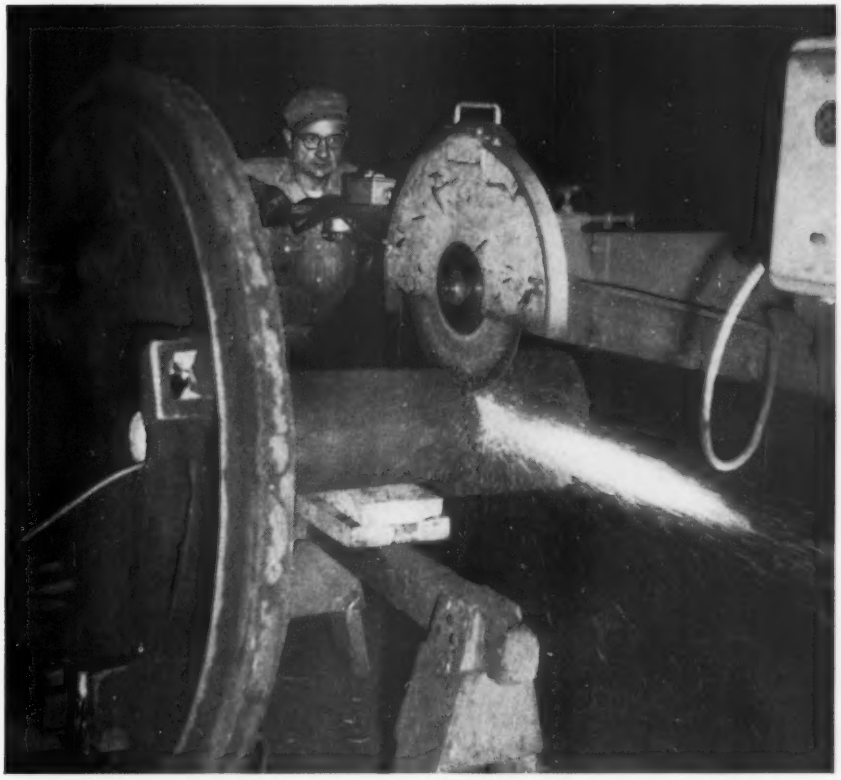
It's one thing to cut half-inch gates and risers off small castings but, when you have to cut through a solid foot of high strength cast iron, the problems of heat and wheel-wear are no joke.

At The Black-Clawson Co., Inc., Watertown, N. Y., one of the World's biggest manufacturers of paper-making machinery, they regularly have to trim up castings as heavy as 3500 lbs. with risers as thick as 12" in diameter. So when Bay State research produced the now famous BZ2AA reinforced cut-off wheel, Bay State Abrasive specialist Howard Beacham saw to it that several samples were tried at Black-Clawson.

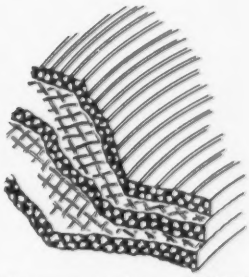
Results? Well, as Foundry Superintendent Ted Frazell says: "It isn't exactly the same as a knife through butter, but it's the fastest cut-off wheel *we've* ever seen."

"Safety is important too," adds Cleaning Room Foreman C. W. Shay. "A man doesn't do his best work when he's gun-shy the way you get with a wheel that shatters on you if it gets twisted a little. But the boys in my department have real confidence in this BZ2AA. They *know* it's safe."

Like Howard Beacham, your local Bay State factory representative or distributor is a trained abrasive specialist . . . a problem-solver who can often save you time, trouble and money. *Better grinding at lower cost . . . that is his business.*



(*Left*) Operator Leo Busler regularly takes slightly over two minutes to cut a 12" riser off a 3500 lb. dryer head casting. He uses a Bay State 24x5/16x1-3/4 BZ2AA abrasive cut-off wheel.



Cut-away section of BZ2AA wheel shows reinforcement between layers of bonded abrasive. Improved Bay State bond formulation and bonding technique result in accurate control and close matching of wear rates of all three major components of wheel . . . bond, reinforcement and abrasive.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Massachusetts.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh. *Distributors:* All principal cities.

STOP

uneven wheel action and costly stock removal

USE SIMONDS SNAGGING WHEELS WITH

NEW V9 BOND

Greater uniformity of grinding action – faster rates of stock removal – and consistently superior performance from job to job and from order to order! That's what V9, the new chemically designed glass bond, gives Simonds Electrolon (silicon carbide abrasive) vitrified bonded wheels for grinding gray iron castings, unannealed malleables, brass and bronze. Typical specification for floor stand snagging: C16-R-V9. Order from your Simonds distributor.

CALL YOUR SIMONDS DISTRIBUTOR

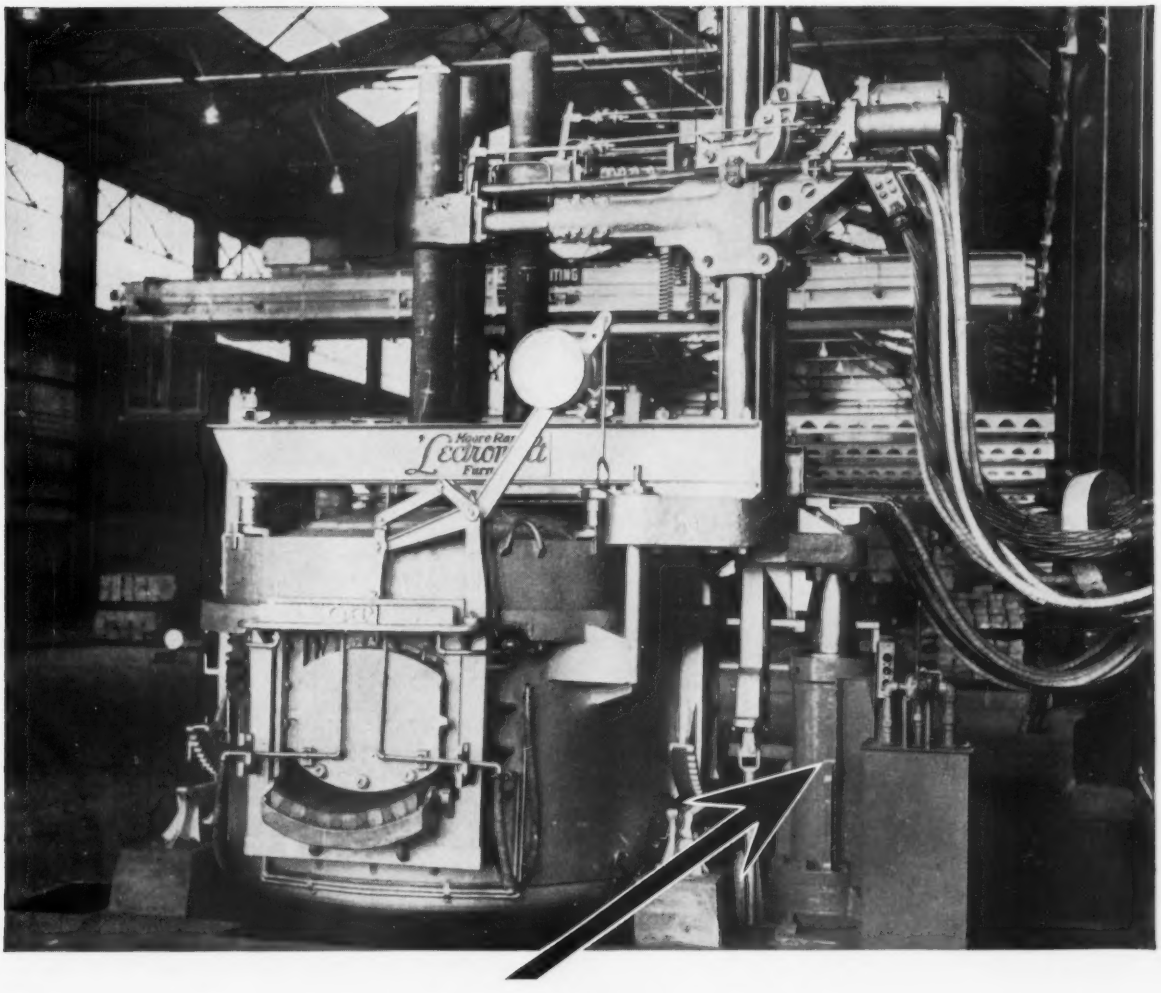
Proven products
Dependable know-how
Quick supply

SIMONDS ABRASIVE COMPANY

Tacony & Fraley Sts., • Philadelphia 37, Pa.

Division of Simonds Saw and Steel Co.

BRANCHES: CHICAGO•DETROIT•LOS ANGELES•PHILADELPHIA•PORTLAND, ORE.•SAN FRANCISCO•SHREVEPORT



Separately mounted roof lift-and-swing mechanism on Lectromelt Furnaces . . .

Offers these advantages

★ No heavy parts attached to furnace shell to cause strain and distortion

★ No jarring of roof, electrode arms or ram parts when heavy charges are dropped into the furnace

★ Allows uniform heat radiation all around the shell

★ Roof lift mechanism is away from excess furnace heat

★ Roof can be lifted higher, permitting larger charges

★ Shells can be readily interchanged

★ ★ ★

All good reasons for specifying Lectromelt furnaces. They're described in Catalog No. 10. Lectromelt Furnace Division, McGraw-Edison Company, 314 32nd Street, Pittsburgh 30, Pennsylvania.

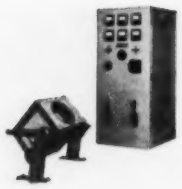
Lectromelt®

McGRAW-EDISON

STANDARD SIZES UP TO TWO HUNDRED TONS CAPACITY

CANADA: Canefco Limited, Toronto... ARGENTINA: Master Argentina, Buenos Aires... ITALY: Forni Stein, Genova... ENGLAND: Electric Furnace Co., Ltd., Weybridge... GERMANY: Demag-Elektrometallurgie, GmbH, Duisburg... SPAIN: General Electrica Espanola, Bilbao... FRANCE: Stein et Roubaix, Paris... BELGIUM: S. A. Stein & Roubaix, Bressoux-Liege... JAPAN: Daido Steel Company, Ltd., Nagoya

Circle 600 on Page 53



WHAT DOES INDUCTOMELTING* MEAN TO YOU?

WITH INDUCTOMELTING

You get all the inherent advantages of high-frequency induction melting—high melting speeds, low metal losses, accurate analysis of alloys, precise temperature control, homogenous melts, greater purity—combined with the many benefits available only in INDUCTO equipment.

INSTALLATION COSTS ARE LOWER. The control panels are shipped complete—including the capacitor bank, selector switches, high-frequency transformer, *even the M-G set* in some units—and ready for easy installation. The furnaces have side-entrance leads, eliminating the need for furnace pits. A minimum amount of bus bar is needed to complete an installation.

OPERATING COSTS ARE LOWER. Every INDUCTO component is constructed with operating efficiency in mind. The water-cooled furnace leads, the selector switches, the furnaces themselves, the numerous control components, the transformers with an efficiency of 99.5%—all have been designed and selected for the best possible operation. When combined with INDUCTO'S high melting speeds and accurate metallurgical control, these features mean appreciable savings for you.

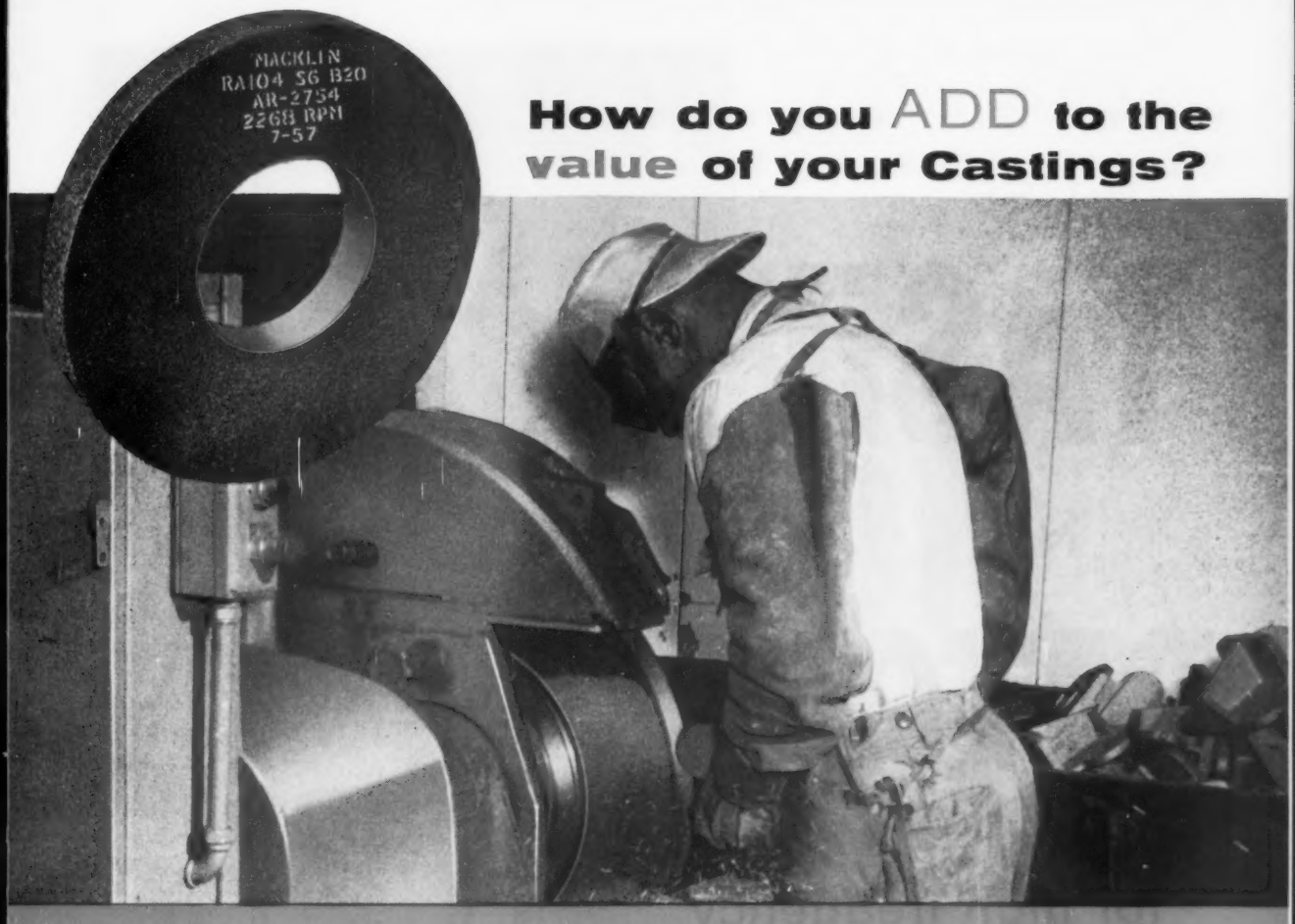
MAINTENANCE COSTS ARE LOWER. It is a natural consequence that equipment designed for the best possible operation will perform satisfactorily over a long period of time. Careful engineering plus the singular use of strictly quality materials and components means longer trouble-free operation.

The end results of INDUCTOMELTING are better, lower-cost castings with less rejects—just the competitive advantage you need to build sales volume and profit. For complete details, write for Bulletin 70, Inductotherm Corp., 412 Illinois Ave., Delanco, N. J.

* *INDUCTOMELTING is high-frequency induction melting PLUS the additional advantages of Inducto design features and engineering techniques.*

INDUCTOTHERM

INDUCTO ... the mark of modern melting



How do you ADD to the value of your Castings?

There's a MACKLIN *"wheel of Profit"* ..... that will do the Job!

WHETHER YOU SNAG CAST IRON, MALLEABLE IRON, OR NON-FERROUS CASTINGS, you snag more metal per dollar, keep your finished casting costs down, when you put Macklin snagging wheels to work in your cleaning room. Yes . . . grinding wheels do add value to your castings, and MACKLIN wheels add *more* at *less cost* to you.

On floor stands, portables, and swing frames, Macklin foundry wheels give cool, fast cutting. Long wheel life. They require less dressing, and hold corners better. And, Macklin's modern production techniques give users the closest possible wheel duplication, order after order.

LEADING FOUNDRIES REPORT...

Alloy nickel *"wheel cuts fast, finish is good."*

Steel Castings *"time per casting cut almost 4 minutes."*

Pearlitic iron *"cutting action very good. Long life."*

Cast iron *"wheel outlasted competitive wheel by 12 hours."*

YOUR MACKLIN DISTRIBUTOR WILL GLADLY ARRANGE AN ON-THE-JOB TEST, or write direct.

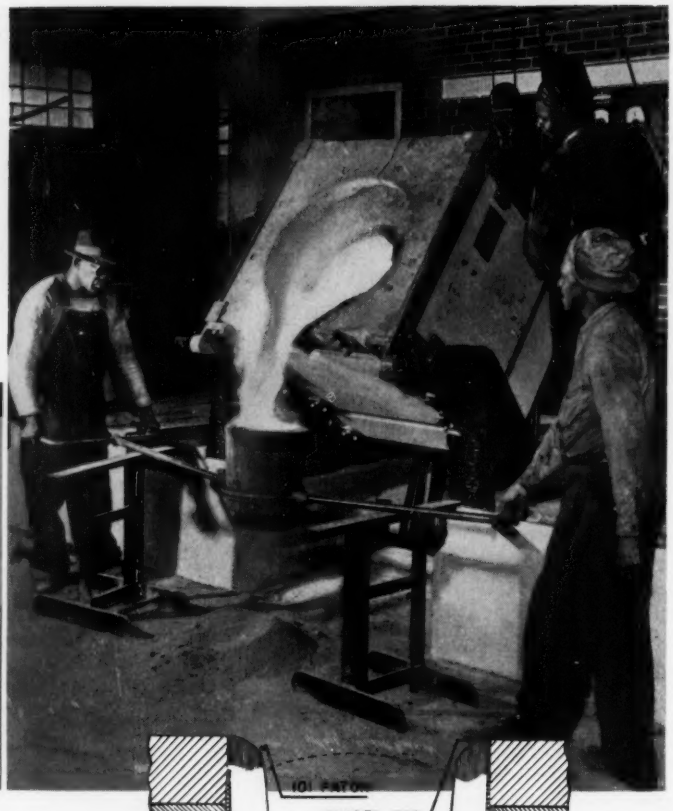
GRINDING WHEELS

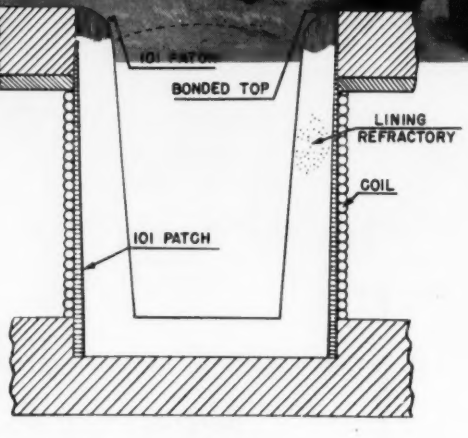
MACKLIN company • Dept. 22 • JACKSON, MICHIGAN

Circle 602 on Page 53

USE

TASIL NO. 101 PATCH





for high frequency induction furnaces

TASIL (Taylor Sillimanite) No. 101 Patch is widely used by operators of high frequency induction furnaces for coating of the inner surface of the water-cooled, primary coil. When air dried, this coating will:

1. **Protect the coil when the crucible is being rammed in place.**
2. **Protect the coil from damage in the event of a leakage of metal through the lining proper.**

Properties which qualify TASIL No. 101 Patch for this service are: *high di-electric strength . . . smooth working properties . . . softening point above 3200° F. . . . negligible shrinkage or expansion . . . can be used with either an acid or basic lining.*

There is a complete line of TASIL (mullite), TAYCOR (corundum-base) and TAYLOR ZIRCON Ramming Mixes and Cements for every metallurgical need. Write for recommendations to cover your melting requirements.

The CHAS. TAYLOR SONS Co.
A SUBSIDIARY OF NATIONAL LEAD COMPANY
REG. U. S. PAT. OFF.
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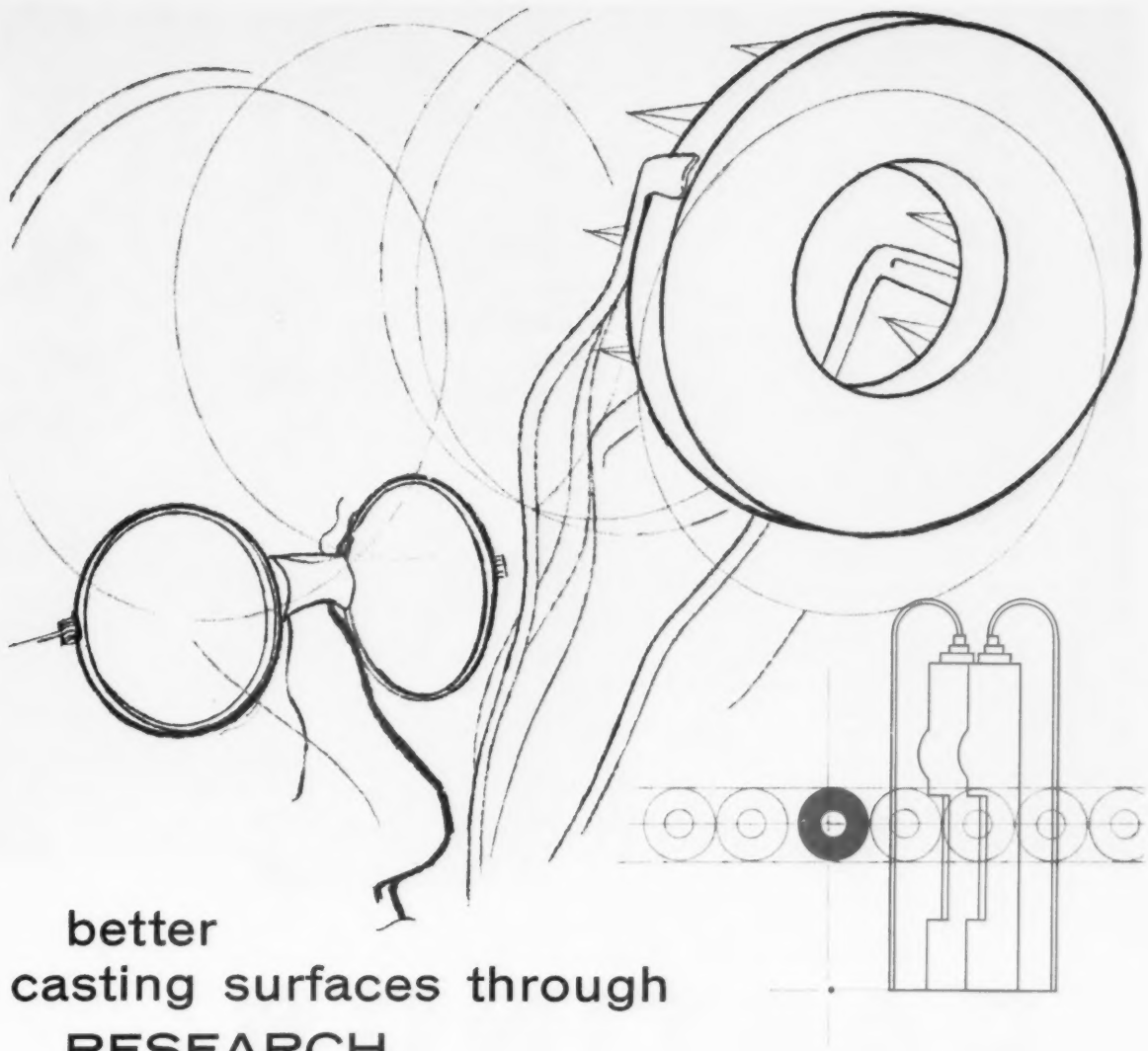

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February 1959

Creating the Climate

Associations and their industries find it difficult to live within themselves. Some related groups frequently have mutual problems, however, which can be handled by co-ordinated action and result in mutual benefits.

In introducing a chapter on "Co-operation with Other Associations" in his book *How To Use Your Trade Association* (Prentice-Hall Inc.), Walter Mitchell Jr., Associated Management Consultants, Cleveland, stresses the importance of working together:

"Practically every line of business has some problems in common with other lines, problems that cannot be solved effectively without central leadership. Many associations have already co-ordinated their efforts with other associations to meet this need. Some have solved their common problems through small, single, informal conferences; others have formed special joint committees or large permanent organizations to carry on the co-operative efforts."

Among the foundry industries, co-ordination is the function of the National Castings Council, a voluntary organization of the following 11 organized groups serving both foundry and allied industries: Alloy Casting Institute, American Foundrymen's Society, Foundry Educational Foundation, Foundry Equipment Manufacturers Association, Foundry Facings Manufacturers Association, Gray Iron Founders' Society, Investment Casting Institute, Malleable Founders' Society, National Foundry Association, Non-Ferrous Founders' Society, Steel Founders' Society of America.

The council was organized in 1947 after experiences during World War II showed clearly the importance of united action on the part of castings producers in dealing with government in time of emergency. Purpose of the council, as stated in the bylaws, is "to provide a medium for co-operative action among various associations, societies and institutes serving the foundry industry on matters of mutual interest which are beyond the scope of the individual societies or which can be performed better by collective action."

Two representatives from each member organization meet several times a year to get better acquainted, to review common problems, and now and then to suggest that one of the council members undertake a project of special interest to all.

Activities of the National Castings Council may not be considered spectacular. Action of the council representatives usually does not make the headlines.

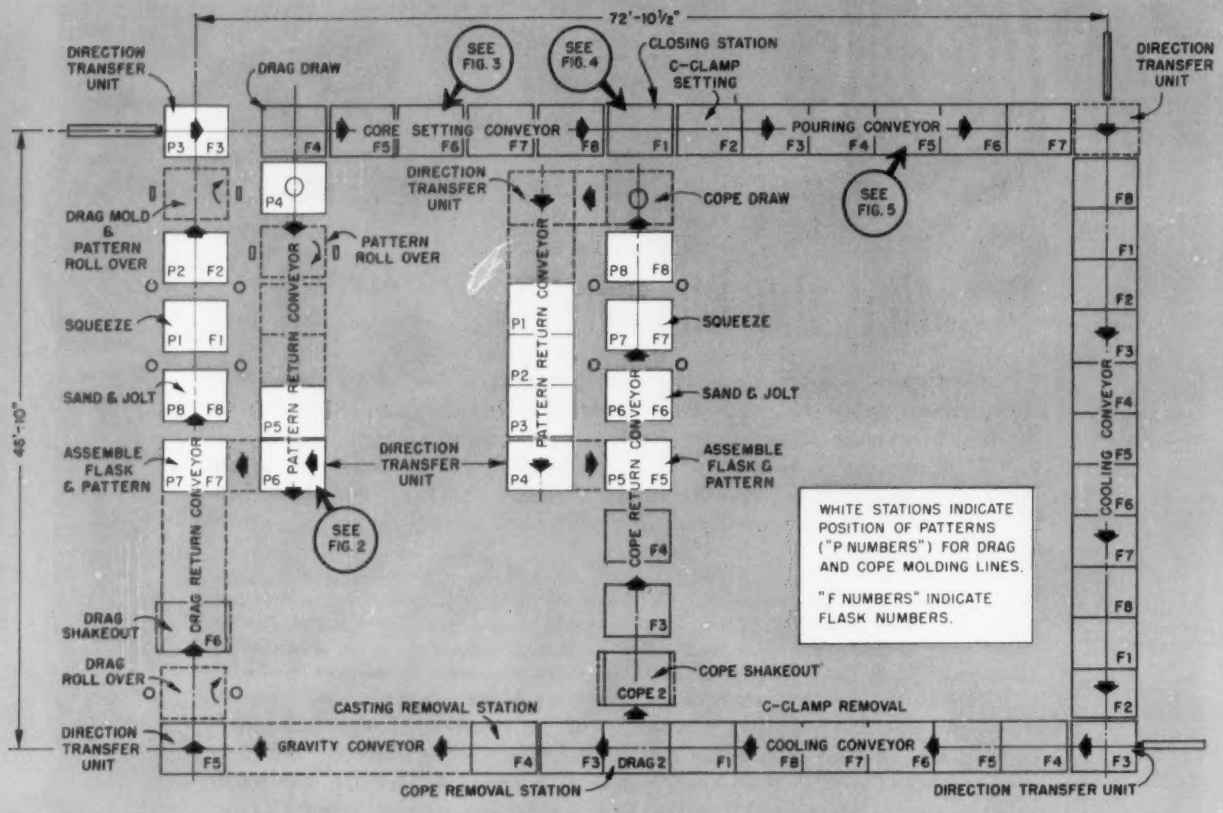
Nevertheless, the council has made definite contributions to the well-being of the foundry industries. As was planned at the time of founding, it provides an organization in being which is ready and able to move quickly in the service of both government and castings producers in time of national emergency.

Beyond that, the council has developed a feeling of mutual understanding and respect among leaders of its various member organizations. Elected officers and staff executives of these 11 associations do not hesitate to consult each other when such action can bring benefits to producers of castings.

After 12 years, the National Castings Council still is creating the climate for co-operative action in this basic industry.

Frank G. Steinebach

Editor



Automatic Molding Line

New line is part of a modernization program begun about two years ago to improve working conditions and raise casting quality

● AMERICAN-STANDARD Corp., Baltimore, Md., has put into production an automatic molding line which turns out a 6600-lb poured mold (including flasks, sand, and casting) every 45 seconds. The line produces sinks and wash basins and is part of a modernization program started about two years ago. At that time two new cupolas with automatic chargers and an automatic molding line for bath tubs were installed. The tub cleaning room was remodeled and mechanized about a year ago, and the small ware cleaning room now is being mechanized.

Main purpose behind the modernization program is to improve working conditions and raise casting quality. Production capacity remains about the same. Experience to date on the small ware line indicates that a more uniform mold hardness has been achieved, less sand inclusions are experienced, casting surface finish is better, and over-all casting quality is at a higher, more consistent level. Grinding and other cleaning operations have been reduced as a result of the improved quality. Defective castings are expected to be less than 1 per cent on a production of about 900 castings a day.

Sand Preparation — Synthetic sand mixes are prepared in 5000-lb batches in two automatically-cycled mullers equipped with moisture determination and addition devices. Weigh hoppers measure AFS 70 sand from 80-ton bins over each muller, and bond additions are weighed by hand. Mixes are held to 2.3 per cent moisture, 5-6

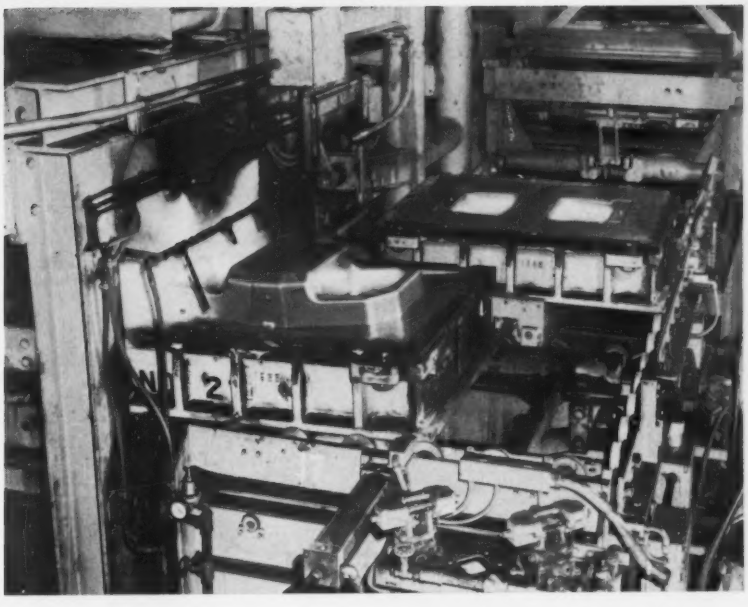


Fig. 1—Numbers on flasks and patterns show how they are coordinated as they move through operations on the molding line

Fig. 2—Drag pattern is given spray of liquid parting as it rolls into a lowering device over the main loop conveyor

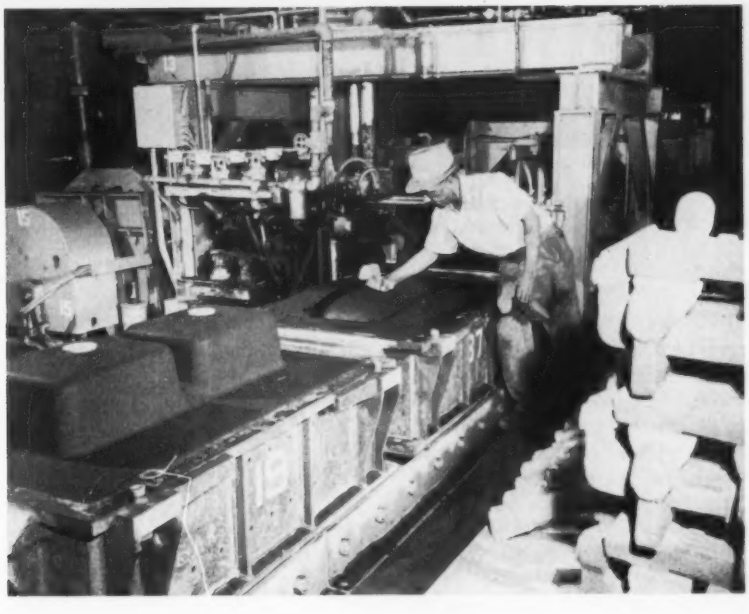


Fig. 3—An operator sets drain cores in drag molds while they wait to be indexed to closing device at the next station

Produces Sanitary Ware

By ROBERT H. HERRMANN
Associate Editor

per cent AFS clay, and 2.0 per cent wood flour to obtain a green compression strength of 9-10 psi, permeability of over 95, and flowability of 65 per cent by the Rowell measurement system. Sand tests are made in the company laboratory every hour.

Mullers empty to a basement-level belt conveyor feeding a bucket elevator which discharges to an overhead distribution belt. Plows actuated by level determinators in hoppers over the cope and drag machines remove the sand.

Molding System—Inside dimensions of fabricated steel flasks used in the system are 52 x 36 x 18 in. deep. Eight sets of flasks are used. Wear-resistant, replaceable shakeout rails are mounted on both ends of each flask to save mating surfaces of the flasks from damage.

Flanged-wheel conveyors are arranged in a rectangle encompassing the molding system. Flasks and molds indexed around the rectangle are in constant use; thus flask storage conveyors are not required. Steel pattern plates, most of which contain two patterns are mounted on stools the same size as the flasks. They shuttle around each molding unit on a pattern return conveyor.

The molding cycle starts with a drag flask rolling by gravity to a hydraulic lowering device where it rests, upside down, on rollers under the bottom end flanges and is held in place by dogs on the lowerer which drop behind the flask.

In the meantime a pattern rolls into the side of the lowerer under the flask and is sprayed with liquid parting as it enters. The pattern

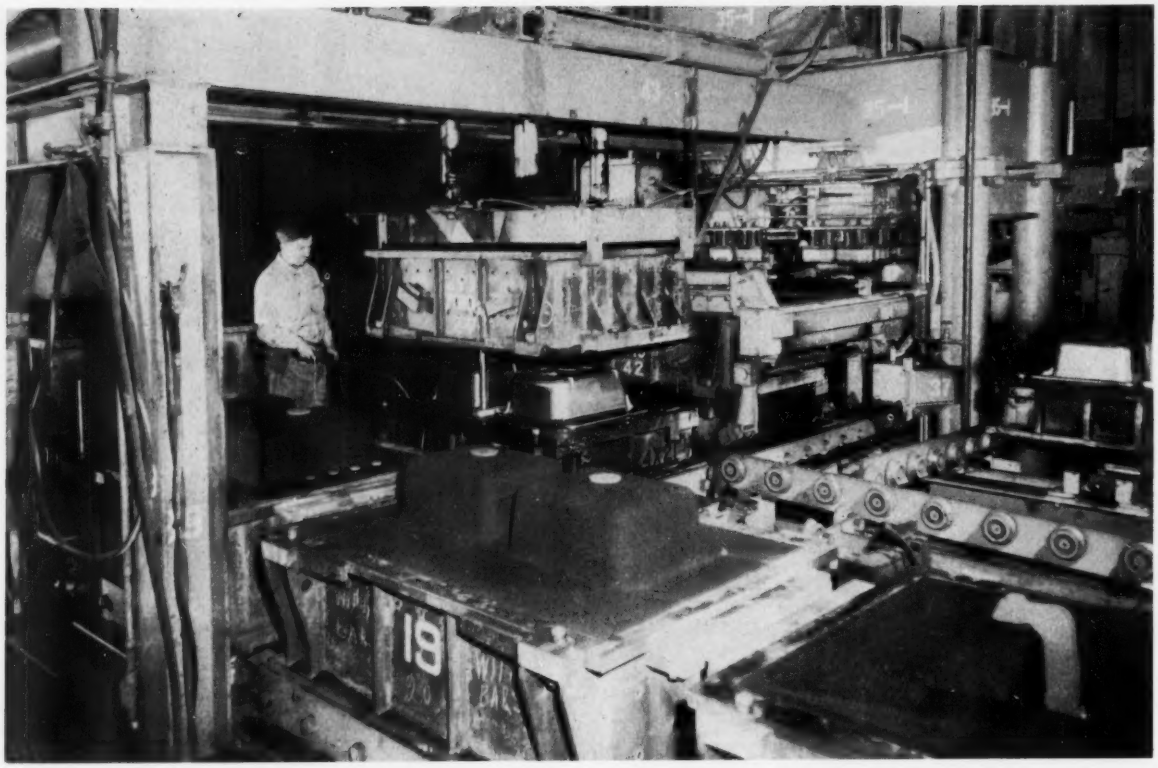


Fig. 4—An air-operated lift and shuttle draws the cope off the pattern, moves it over the drag, and closes the mold. An air cylinder pushes pattern from the draw station to the gravity return conveyor shown at right

rolls in on a wheel conveyor section which is lowered by air cylinder to deposit the pattern assembly on the main loop conveyor. After the flask is lowered to the pattern, an air cylinder device shuttles the assembly to an air cylinder lowering section of conveyor which lowers it to an air-powered jolt table. As this occurs, an upset is lowered to the flask by air cylinder and a measured amount of sand from the overhead hopper is dropped in. The upset rides with the flask and pattern assembly during jolting, then is returned to its initial position.

The conveyor section raises the filled mold half to conveyor level. The same shuttle that brings in the next pattern and flask assembly moves the jolted mold to the squeeze station. A hydraulic ram performs the squeeze by raising the filled drag off the conveyor to floating squeeze blocks which are spaced to fit between bars in the flask. At the top of the ram stroke hydraulic fluid is diverted to individual cylinders above each squeeze block. Pressure in each cylinder is equalized to provide a uniform squeeze on all sections of the mold regardless of sand height under each block. This is done to achieve uniform mold hardness.

When the mold is lowered to conveyor level, the air shuttle previously described moves the rammed mold into a waiting station as it brings in the filled mold and also moves the mold that was in the waiting station into the rollover. This shuttle device moves four units simultaneously but independently with dogs mounted on the cylinder plunger arm. Spacing is needed between the units for performing the separate processing operations.

A hydraulic cylinder pushes the rolled-over assembly into a direction transfer unit. A second hydraulic cylinder pushes it into the pattern draw station and, in so doing, pushes four molds ahead of it through the core-setting area, the last drag going into the mold closer. At the draw station, an overhead air shuttle moves over the pattern stool and air-operated clamps lower to grasp the stool and raise the pattern off the mold. The shuttle moves the pattern into a rollover. As the pattern enters the rollover, a lip on each end of the stool rides between double sets of wheels on a conveyor section. When the shuttle releases the pattern assembly and moves back to ready position, the pattern assembly is rolled over and released by the clamps to roll out on the lower set of wheels to a gravity wheel conveyor. The pattern is stopped by an air snubber just before it enters a direction transfer unit which rolls the pattern into the lowering station. The direction transfer unit is simply a section of wheel conveyor at 90 degrees to the return conveyor that is raised and lowered by air cylinder. Air snubbers are used on all gravity conveyor sections in the system to reduce shock to the system and to patterns, flasks, and molds.

Cope Side Is Similar—The cope line is similar to the drag line with the exception that no rollovers are required. The draw is made by an

Fig. 5—Molds are poured by operator on a grated walkway about 4 ft above floor level. Ladles are hand-tilted and electrically-propelled along an overhead monorail

air-operated lift and shuttle which moves the cope over the drag and closes the mold. An air cylinder pushes the stooled pattern out of the draw station to the gravity return conveyor.

A worker knocks two C-clamps on each side of the mold to hold cope and drag firmly. A hydraulic cylinder under the wheel conveyor pushes the closed molds and six ahead of it through the pouring area where they are poured with hand-tilted ladles suspended from an electrically-propelled monorail carrier.

Poured molds are indexed into a 90-degree direction transfer unit. Here a short-stroke hydraulic cylinder pushes them to a gravity wheel conveyor where they cool. A similar direction transfer unit at the end of the conveyor pushes them to a gravity wheel conveyor where molds roll to the cope removal stations. A worker removes the C-clamps along this conveyor and hangs them on protuberances on the cope flasks.

An air-powered shuttle moves over the mold and air-powered fingers lower between flask bars to hold the casting in the drag as clamps lower to grasp the cope and lift it off the drag. The shuttle moves back and sets the cope on a vibrating shakeout where the wear strips of the flask rest on vertical extensions of the shakeout table. The drag is indexed under an exhaust hood at the next station where two workers use an air hoist to lift castings out of the mold and set them on a grating forming part of a walkway about 4 ft above the floor and level with the mold conveyor. Gating metal is knocked off and hooked to a chute feeding a tote box. Castings are hooked to a second chute and slide to the floor. They are loaded to hand trucks or to pallets and power-trucked to the cleaning room.

Empty drags are indexed to a short section of gravity conveyor and roll into a 90-degree, raising conveyor section direction transfer unit which rolls the drag into the rollover. Flanges at the ends of the flask ride between double sets of wheels. The rolled-over flask rolls out to a wheeled conveyor section in the shakeout station. Air clamps grasp shakeout strips on the flask, the conveyor section is lowered away from the flask, and the flask is vibrated for complete sand removal. The empty flask, suspended by flanges, rolls on a wheel conveyor into the lowering device over the pattern to repeat the molding cycle.

Spill sand from shakeouts falls to oscillating pan conveyors in the basement and is run through a perforated top deck, dropping to a solid pan thence is conveyed to an elevator which empties onto a belt conveyor over small sand storage bins. Sand is fed from these bins through vibrating screens to storage bins over the mullers.

Hot Blast Cupolas—Metal, coke, and limestone charges are dropped from weigh hoppers to cone-bottom buckets on an electric car. A gantry charger lifts the buckets for movement into two 78-in. ID, hot blast, water-cooled cupolas used on alternate days. Blast air is heated to 400° F by oil-fired heaters. Both cupolas are equipped with wet-type gas washers, the water being used also for a slag sluice at the front of the cupolas.

The 4500-lb metal charges contain 7 per cent return castings, 23 per cent purchased iron scrap, 28 per cent gates and risers, and 42 per cent pig iron. Coke is 500 lb and limestone 170 lb. Metal analysis is 3.50-3.60 TC, 2.40-2.60 Si, 0.60 P, 0.20-0.22 Mn, and 0.085 S.

The analysis employed is one that produces an iron with a coefficient of expansion the same as that for the enameling material used in finishing the ware. This is necessary, for otherwise enamel will not adhere correctly. For the same reason carbon content is kept high and sulfur low.

Iron is tapped to a forehearth at 2750 to 2800° F, then poured at 2700 to 2750° F into 1000-lb ladles moved by overhead monorail carriers. These ladles are transferred to pendant-controlled carriers for pouring molds on the new line.

This automatic molding line was designed, engineered, and installed by SPO Inc., Cleveland.

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How To Make Incentive

The author warns of certain pitfalls to be avoided in incentive systems and outlines basic principles necessary in plans for production workers, sales personnel, and management men

● MANY FOUNDRIES use wage incentive plans in molding, coremaking and cleaning. The plan may be based on piece-work or on standard or "earned" hours. A piece-work rate is best established by time study to determine the allowed time per piece after making provision for fatigue and normal interruptions. The proper hourly rate based upon a careful evaluation of the job, multipled by the allowed time determines the piecework rate.

A modification of the piece-work system consists of tabulating the "allowed" or "earned" hours for each worker. The total standard or "earned" hours times the worker's hourly rate gives the same dollar total of compensation that would be obtained by figuring the pieces produced at the various piecework rates.

The latter plan permits easier payroll prepartion and the determination of labor rate and permits labor efficiency variances that are important management barometers.

Many wage incentive plans other than piece-work rates or the equivalent of compensating the worker for "earned" or standard hours are in use. Most of these plans give the worker a percentage of the labor saving rather than the entire amount. Practically all wage incentive plans guarantee the worker a full day's pay at his established hourly rate. Since these wage incentive methods are designed to increase production, great care should be exercised so that the quality of the castings does not suffer. This means careful inspection. The employee should not be compensated

Plan should be simple so worker can calculate his own earnings

for defective work except to the extent of his guaranteed day's wage.

Basic Principles—Most authorities agree upon certain basic principles in the establishment of a wage incentive plan. First, the plan should be simple, permitting the worker to calculate his own earnings. Second, the rewards should follow the worker's efforts with as short a lapse of time as possible. Third, the plan should directly compensate the individual worker for that individual's efforts. Group bonuses should be avoided wherever possible.

It is true that certain types of work are adaptable only to group bonuses. However, if at all possible, efforts and rewards should not be averaged. The lazy and incompetent worker learns quickly how to become a shirker and yet to benefit from his more industrious and conscientious coworkers. Any group plan based upon averages is an extremely doubtful incentive to the individual worker to exert himself. Group bonuses work well in operations that are performed by a small team working as a unit. But the team must be small enough so that each worker can observe the performance of each other worker. Here the lazy employee probably will be persuaded by the other members of the team to exert himself sufficiently to maintain the average of the group. But when a bonus system uses an entire department or an entire foundry as a group this effect is lost completely.

Sales Incentives—The two principal divisions of a manufacturing business are production and sales. It will benefit the foundry not at all to concentrate on cost reduction

Plans Successful

By URBAN F. VON ROSEN
Soloway & von Rosen
Cleveland

Reward should follow worker's effort as soon as possible

if it cannot sell its castings. We have mentioned some types of production incentives. What incentives are possible to increase sales? The commission paid to an employee sales-engineer or to an outside sales agency is one such incentive. In the case of an employee salesman his weekly drawing account may become by intent, or otherwise, a guaranteed wage. There is no doubt that the foundry's customers are its most important possession. But to what extent does price enter into the worthwhile acquisition of a new customer or the retention of an old customer?

Pay worker for his individual effort. Avoid group bonuses

There are some purchasing agents more interested in a low price than they are in quality castings, a dependable source of supply, and good service. To acquire a new customer of this type by cutting prices frequently results in a loss to the foundry, and, in addition, the new customer will soon be lost to another foundry which cuts prices even more drastically and loses even more money. The sales engineer may be able to offer suggestions that will reduce molding time, the cores required, or the cleaning time involved. These are legitimate means of reducing the price to the customer. Such suggestions benefit the customer, the individual foundry, and the entire industry. But the selling price per hour for molding time, coremaking time, and cleaning time as determined by a carefully prepared budget never should be reduced. To do so will eventually react to the detriment of both the foundry and the industry.

There is no doubt that the foundry business is a service business. Each foundry is selling the time of its foundry departments. Each molding, coremaking, or cleaning hour has a definite cost. In selling this time the foundry must make a reasonable profit or it cannot stay in business. Certainly an overall price reduction is not an advisable incentive to greater sales. If prices can be reduced without a corresponding reduction in costs, it would appear that prices had been set too high in the first instance.

Management Incentives — It is management's responsibility to acquire an adequate volume of business and to produce it at an adequate profit. It is the aim of management to make the most efficient use of plant, machinery, tools, materials, and manpower. Assuming ownership-management, which we believe is generally true of smaller foundries, the incentive for management is to obtain a fair return on investment plus reasonable management salaries. Key men can be induced to remain with the company through profit-sharing plans, pension plans or options to purchase shares of the capital stock of the company.

Arrangements of this nature give key personnel a sense of security and to some extent deter them from seeking employment elsewhere. They accomplish little in inciting the worker to greater effort in his daily work. To the extent possible, management should set standards for each task and should reward each worker on the basis of how well that particular task is performed.

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NOW THEY'RE CASTING PHOTOS

New process involves use of conventional photographic methods to make wax patterns for producing finely detailed castings by the investment casting technique. Here's how it's done

By ROBERT H. HERRMANN
Associate Editor

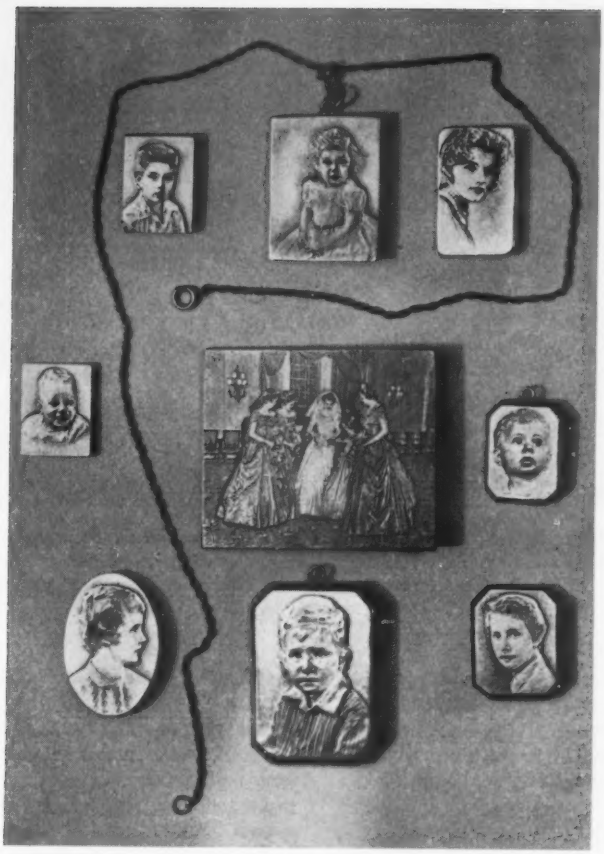
The original photograph

The master wax pattern

Mold for production patterns

The completed, as-cast medal

Production wax patterns made in the plaster mold, far left, are gated and wax-welded to a sprue on a plywood base. Then a flanged-bottom, perforated flask wrapped with heavy paper is placed over the assembly to contain the mold slurry



Examples of castings produced by the process. Detail of women's dresses, carpet pattern, and background in plaque in center shows possibilities of the process

● AN UNUSUAL process which has potential for opening up a new, large market for investment castings has been developed co-operatively by Precision Metalsmiths Inc. and Frank Berne, photographer, both of Cleveland.

Basically, the process involves the use of conventional photographic methods to produce a master pattern mold from which an unlimited number of production wax patterns can be produced. These patterns, in turn, are used to make investment molds into which almost any castable metal can be poured to produce cast duplicates of the original pattern. The process is known as Photocast, a trademark of Photocast Inc., Cleveland.

Ability to reproduce exact and minute detail is an outstanding feature of the process. It adds texture and depth to two-dimensional photographs to produce three-dimensional replicas. The contours of these replicas may be raised or recessed as desired. Furthermore, positive or negative replicas can be made, depending on the original photograph used to make the master pattern.

To date, the process has had only limited commercial application, mainly for producing medals such as those illustrated here. Such medals can be oxidized or rubbed with pigments of various colors to achieve highlighting effects. They also can be plated with gold, copper, cadmium, chromium, or silver. Detail in these medals is so fine that pores of the skin and the hair of eyebrows and head are reproduced exactly. Medals have been cast in sizes ranging from $\frac{1}{4}$ in. square to 16 x 20 in.

Developers of the process foresee applications for making dies and molds for casting, stamping, coining, forging, or pressing of metals, plastics, and other formable materials. One big factor in the commercial and industrial potential of the process is that it is relatively inexpensive.

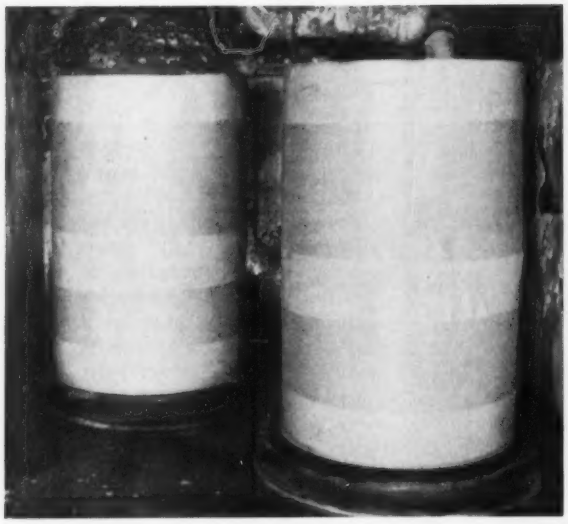
How It Works — The photographic process used in making the master pattern mold involves conventional photographic enlarging equipment with daylight fluorescent lamps as the light source. An ordinary, sharp negative is placed in the enlarger, and light is directed through it to a piece of flaw-free plate glass coated with an emulsion sensitive to ultraviolet light. This coating, 1/32 in. thick, is obtained by pouring the liquid emulsion on the plate, letting excess material flow off the edges. The coated plate is dried at room temperature in still air preferably of low humidity. Excessive heat has an adverse effect on the emulsion as do air currents and vibration which may cause rippling of the emulsion.

After exposure for $\frac{1}{2}$ to 1 minute in the enlarger, the plate is placed in a tray and processed with chemical solutions which leave deposits on that portion of the emulsion which has been exposed to light through the photographic negative. Thickness of the deposits varies according to the amount of exposure determined by gradations of shading in the negative. Deposits up to 1/32-in. thick are achieved at the present state of development of the process.

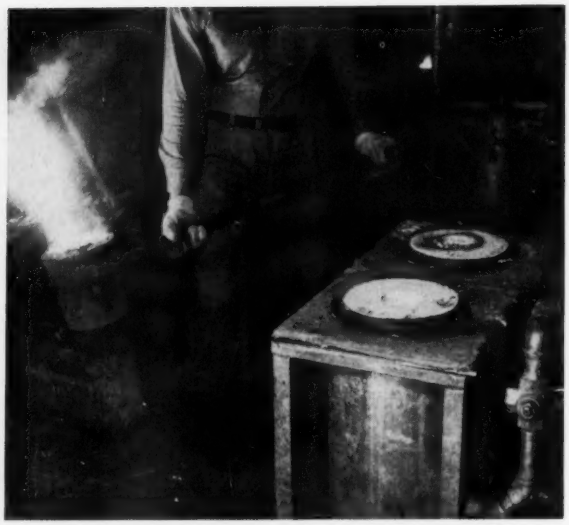
When the chemical deposits have attained the depth desired, the plate is removed from the bath, excess liquid shaken off, and a standard petroleum-base, microcrystalline investment pattern wax poured over the design deposited on the plate. A wax thickness of about $\frac{1}{8}$ in. is achieved by placing a shallow frame around the glass plate.

After the wax has solidified, forming a reverse copy of the chemically-deposited design on the emulsion, it is lifted off the plate and laid on a flat surface with the design-bearing side up. A flask is placed around the wax pattern and filled with a dental type plaster to form the master pattern mold. Thousands of production patterns used in the investment casting process can be formed by pouring wax into this mold.

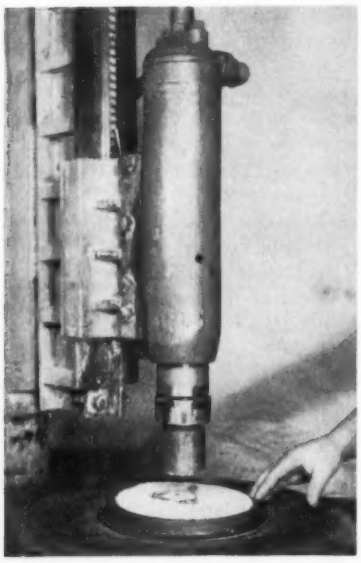
Making the Castings—The production patterns can be mounted on a wax sprue to form a tree and



Flasks are wax-welded to the plywood base holding the pattern assembly and placed in vacuum chamber for investing with refractory mold slurry



Flanges around the flasks suspend molds in vacuum chambers for pouring. Castings produced this way have good surface finish and fidelity to pattern



A vibrating hammer is applied to the sprue of a cooled casting to remove it from the mold which is fragile at this point

the assembly placed in a flask for investing in the usual manner, or the newer process of making monolithic ceramic shell molds may be employed. Precision Metalsmiths uses both molding methods. Both types of molds are placed in a vacuum chamber when molten metal is poured into them. Forced removal of gases minimizes possible porosity in the castings and also permits atmospheric pressure on the open sprue to force molten metal into the mold cavity. This process assures that the casting will have good surface finish and fine fidelity to intricate configurations of the pattern.

Flasks used for the invested molds are perforated to permit effective application of the vacuum through the porous refractory mold material to the mold cavity. They also have a circular flange about an inch from the bottom end which seals the mold in the vacuum chamber during the metal pouring operation. Heavy paper is wrapped around the outside of the flask and held in place with gummed tape. Purpose of the paper is to contain the refractory mold slurry until it has solidified. The flask is placed over a tree of patterns which has been wax-welded to a plywood base plate. Molten wax is flowed around the junction of flask and plate to hold them in position.

A group of such assemblies then is placed in a vacuum chamber where each flask is filled with a phosphate-bonded silica refractory slurry, thus investing the pattern assembly. The slurry flows from a spout which can be moved over each flask by a control outside the chamber. Filling the flasks in a vacuum minimizes entrapment of air bubbles in the mold material. Filled flasks are removed from the chamber and air dried for 4 to 6 hr.

The plywood base plates are removed and the molds placed in an oven where the wax patterns melt and run out of the molds. As the oven temperature is raised to 1300° F, residual wax in the molds is burned away, leaving a clean mold cavity. The paper surrounding the flask also burns away. Total time in the oven is 12 hr.

Ceramic shell molds do not require flasks. These molds are formed by dipping the tree of patterns into a fine refractory slurry and sprinkling with dry, granulated refractory. Several dip coats are applied to obtain the desired thickness of $\frac{1}{4}$ to $\frac{3}{8}$ in. Patterns are burned out of the molds in an oven and poured under vacuum.

Poured molds of either type are removed from the vacuum chamber and allowed to cool. A vibrating hammer is applied against the sprue to loosen the casting and break up the mold, which is quite fragile at this point. The casting comes out practically clean. Workers use fiber brushes to remove the small amount of mold material adhering to the metal. Castings are cut from the sprue with small rotary saws mounted on portable pneumatic tools, and the remaining gate stub is ground off.

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Air Gap Limits Chill in

CAST IRON ROLLS

Under sponsorship of the Roll Manufacturers Institute, tests were made to determine effects of the air gap between casting and iron mold. Here are the results

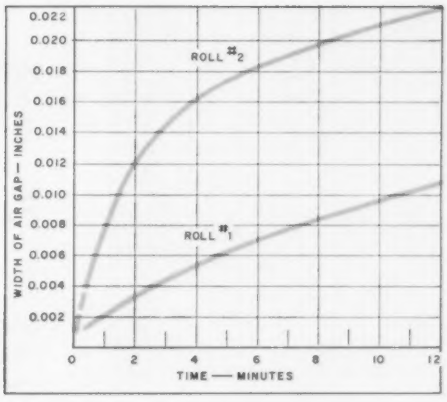

Fig. 1—Width of air gap. Gap enlarged rapidly at first, then more slowly

By J. D. KELLER
Associated Engineers

and

N. R. ARANT
Roll Manufacturers Institute

Pittsburgh

● ONE OF THE most important limitations of the hardness producible in chill-cast iron rolls is the restriction of the rate of solidification. This restriction is due to the formation and growth of an air gap between the iron mold and the newly solidified surface of the casting. The air gap limits the rate at which heat can be extracted from the solidifying metal.

Tests to determine the effects of the air gap are extraordinarily difficult to make in full-sized production rolls. Such tests were made, however, under the sponsorship of the Roll Manufacturers Institute, on rolls of three different sizes. These rolls ranged from about 12 to about 22 in. in diameter.

If the tests could have been perfect, little calculation would have been needed to evaluate them. Because of practical difficulties, however, temperature measurements were not always obtained at the times and locations desired. Mathematical methods therefore had to be developed for interpolating between and extrapolating beyond the measured points.

Many of the conclusions from the study also apply in a general way to the solidification of steel ingots in their molds.

Gap Forms Gradually—Contrary to general opinion, the air gap did not form suddenly. A gap of some small thickness existed from the beginning. It enlarged rapidly at first and then more slowly, along a smooth curve (Fig. 1). The roll diameter had less influence on the width of gap than other factors such as the roughness of the mold or chiller surface and the thickness of the layer of blacking applied to that surface to prevent sticking.

Radiation across the gap was of minor importance in the early stages when the hard shell of the roll was being formed. Most of the heat abstraction then was effected by conduction through the thin gas layer in the gap.

In no instance did the extrapolated temperature of the inner surface of the chiller or mold exceed 1050° F in these tests.

As shown in Fig. 2, excellent agreement was obtained between the measured temperatures and those calculated by the improved methods mentioned. The application of these methods and the results obtained by them are described at greater length in *Blast Furnace & Steel Plant*, September, 1958, pp. 957-965.

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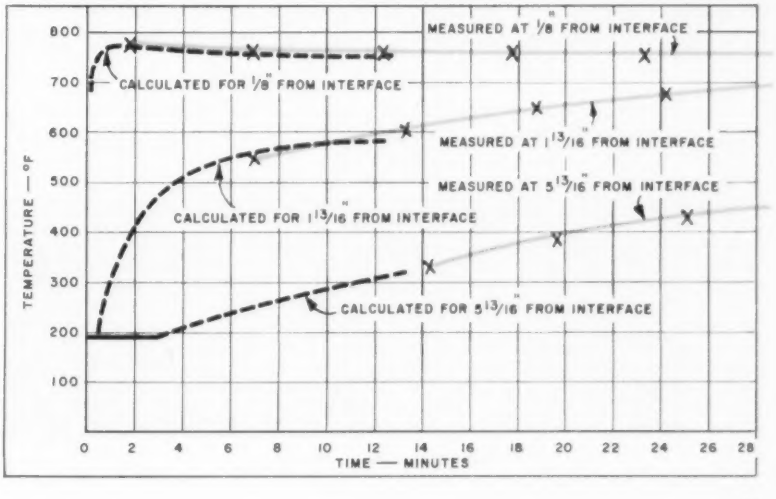
Fig. 2—Temperature in chill. Excellent agreement was obtained between measured temperatures and those calculated by mathematical methods



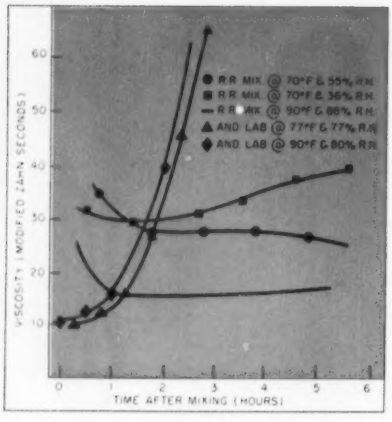


Fig. 1—Results of tests to determine the effects of relative humidity and temperature on the viscosity of precoating slurries

Thickness of Precoat

For Investment Castings

Study shows that thickness of precoating used in investment casting is a function only of viscosity, not of composition, aging, drying time, or the drying temperatures

By DONALD J. KENNY, Ph. D.
Assistant Professor
Dept. of Chemistry

and

PAUL A. RUTT
Research Engineer
Research Institute of Science and Engineering
University of Detroit
Detroit

● DURING an investigation of variables in precoating materials used to produce investment castings for Springfield Armory, a study was made of factors which influence thickness of a precoat film.

Results show that this film thickness is a function of viscosity only. It does not depend on composition, aging, drying time, or drying temperatures. If plastic patterns are substituted for wax patterns, it does not necessarily follow that plastic will receive the same precoat as wax under identical conditions.

Vapor Pressure and Temperature—To determine the effects of relative humidity and temperature on the viscosity of precoating slurries, two representative formulations were tested. Several mixtures of Ransom Randolph Solution 181 (a sodium silicate base) with Ransom Randolph coating powder were tested at various relative humidities and temperatures. Results of these tests are plotted in Fig. 1.

Two mixtures of a recipe by Anderson Laboratories, with an ethyl silicate base, also were tested at different temperatures. Results of this test also appear in Fig. 1.

The Ransom Randolph coating mixture was composed of 408 ml each of Ransom Randolph Solution A and B mixed with 1814 grams of Ransom Randolph coating compound. The Anderson Laboratories mixture was composed of 800 cc of the ethyl silicate base solution with 1464.4 grams of coating powder composed of 3 parts China clay and 17 parts 140 mesh silica flour by weight. The liquid solution was composed of 37.6 per cent by volume ethyl silicate "40," 59.8 per cent denatured ethyl alcohol (190 proof), and 2.6 per cent of 3 per cent hydrochloric acid solution. It was allowed to hydrolyze overnight.

Tests were run in a temperature-humidity controlled cabinet, and the viscosities were measured with a modified Zahn viscosimeter (see "Viscosity Measurements for Thick Slurries," FOUNDRY, May, 1958). The slurry pot was maintained at ambient temperature, and stirring was continuous.

Results, as plotted in Fig. 1, show that the viscosity of the Ransom Randolph mixture is unaffected by relative humidities over 55 per cent, but is affected greatly by temperature. This result probably is due to the large amount of sodium silicate present.

The Anderson Laboratory mixture proved to be relatively insensitive to temperature, but very sensitive to time, with a highly variable viscosity. This sensitivity obviously is due to the high rate of evaporation of ethyl alcohol.

It should be pointed out that the values in Fig. 1 can be related to a room temperature operation if the relative humidity values are converted to absolute water content. For example, a dipping operation inside the temperature-humidity control cabinet at 90° F and 50 per cent relative humidity corresponds to a dipping operation in a slurry pot heated to 90° F in a room where the temperature is 70° F and the

Fig. 2—Results of tests on duplicate batches of a mixture to determine whether dipping changes the viscosity of a precoat slurry

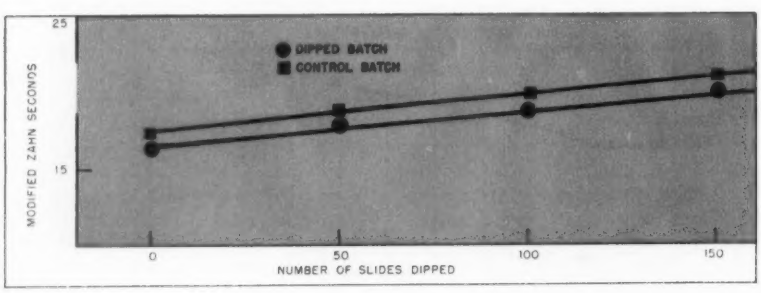


TABLE I—Film Thickness vs. Composition

Slide No.	Thickness After Air Drying One Week (inch)	Thickness After Air Drying Two Weeks (inch)	Thickness When Oven Dried (200° F) (inch)	Viscosity When Dipped	Ratio of Solutions
1	0.0085	0.0085		21.5	
2	0.0090		0.0090		
3	0.0085	0.0090			
4	0.0080		0.0080		
5	0.0070	0.0070			
6	0.0075		0.0080		A/B = 1000/750
Avg.	0.0081	0.0082	0.0083		
7	0.0085	0.0090		21.7	
8	0.0075		0.0080		
9	0.0050	0.0050			
10	0.0070		0.0080		
11	0.0075	0.0080			
12	0.0060		0.0055		A/B = 1000/1000
Avg.	0.0069	0.0073	0.0072		
13	0.0090	0.0095		20.6	
14	0.0090		0.0100		
15	0.0090	0.0095			
16	0.0095		0.0100		
17	0.0090	0.0080			
18	0.0090		0.0090		A/B = 1000/1000
Avg.	0.0091	0.0090	0.0097		
19	0.0095	0.0100		21.5	
20	0.0095		0.0095		
21	0.0095	0.0095			
22	0.0090		0.0090		
23	0.0090	0.0095			
24	0.0095		0.0085		A/B = 1000/1250
Avg.	0.0093	0.0097	0.0090		

relative humidity is 96 per cent.

From a practical viewpoint, this means that the slurry pots can be left uncovered at room temperatures when relative humidity is over 55 per cent. On the other hand, if the slurry is heated to 90° F, it must be covered tightly, or serious changes in viscosity will occur.

Effect of Aging—Fig. 1 shows that there is little change in viscosity with time if the relative humidity is maintained at an adequate level. The initial drop in the viscosity curve (minimum is reached after 1 to 1½ hours) is attributed to the mixing and wetting of the solid particles with liquid.

It would seem then, that a covered pot of slurry could be kept for 4 or 5 hours after allowing for the initial mixing time. Actually, covered pots of slurry have been kept for 3 to 4 weeks without showing any appreciable change in viscosity.

Effect of Dipping—To determine whether dipping changes the viscosity of a precoat slurry, duplicate batches of Ransom Randolph mixture were prepared. After enough time had elapsed to insure stability, one hundred and fifty 2¾ in. square glass slides were dipped 2¼ in. deep in one of the batches only. Viscosities of both batches were checked after each group of 50 slides. Approximately 30 per cent of the total volume of material was removed by dipping 150 slides.

Results of this test are plotted in Fig. 2. They show that viscosity is unaffected by dipping.

Viscosity and Composition — It seemed desirable to know what effect viscosity and composition have on the thickness of the precoating film. Optically flat, square, glass slides were dipped in the precoat slurry and allowed to drain and dry vertically.

A portion of the glass was left uncoated so that thickness and uniformity of the slide could be checked. Glass thickness varied from 0.038 to 0.042 in. from slide to slide, but no noticeable variations in thickness over the surface of a given slide were encountered.

After the dipped slides had dried in air for a week, total thickness and thickness of glass were checked with a portable thickness gage. Subtracting the glass thickness from the total thickness and dividing by two gave the precoat film thickness in inches. (See Tables I and II).

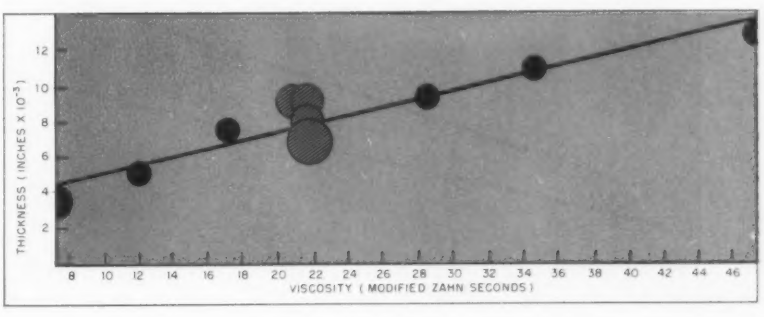
The slides then were allowed to dry for another week to make sure that no further changes in film thickness took place. Some of the slides were dried in an oven at 200° F for three or four days and measured again. In general, precoat film thickness is about 0.01 in. and no variations with prolonged aging or oven drying could be detected.

Two experiments were performed on film thickness. In the first (Table I), an attempt was made to find how composition affects film thickness. All slides were dipped at constant temperature and viscosity in slurries of radically different compositions.

Composition of the slurry was varied by mixing 1000 ml of Ransom Randolph solution 181-A with 750 ml of Ransom Randolph solution 181-B instead of the recommended 1-to-1 mixture. Next, 4440 grams of Ransom Randolph coating compound (silica flour) were added with sufficient water to achieve the desired viscosity. Two further additions of 250 ml of solution 181-B were made with sufficient powder to bring the viscosity back to the starting value.

In the second experiment (Table II), the ratio of 181-A to 181-B was held constant at the recommended 1-to-1 value, and the viscosity was varied by successive additions of water. When constant temperature and viscosity were achieved, slides were dipped, and further additions of water were made. On the em-

Fig. 3—Test results can be interpreted to mean that within the limits of measurements used, film thickness varies linearly with viscosity



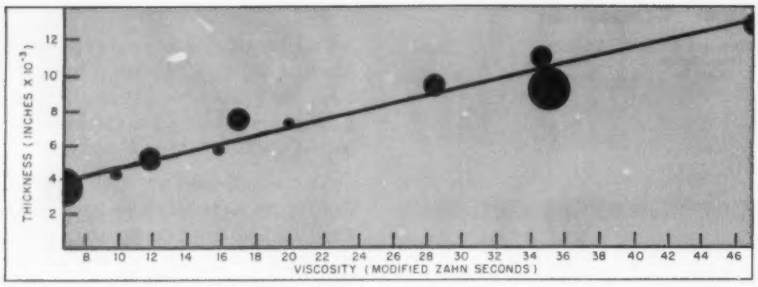


Fig. 4—Chart plots thickness of coating on glass as a function of viscosity of slurry

TABLE II—Film Thickness vs. Viscosity

Slide No.	Film Thickness After Air Drying (inch)	Zahn Viscosity When Dipped	Temperature When Dipped	Remarks
25	0.0230	120+		Slides dipped 3 minutes after mixing.
26	0.0195			
27	0.0245			
28	0.0195			
29	0.0220			
30	0.0225			
Avg.	0.0218			
31	0.0130	47	66° F	Added water to lower viscosity.
32	0.0130			
33	0.0135			
34	0.0135			
35	0.0120			
36	0.0130			
Avg.	0.0130			
37	0.0110	34.5	70° F	Slurry stood overnight and more water was added.
38	0.0100			
39	0.0115			
40	0.0105			
41	0.0115			
42	0.0115			
Avg.	0.0110			
43	0.0100	28.4	70° F	Added more water.
44	0.0090			
45	0.0090			
46	0.0085			
47	0.0100			
48	0.0100			
Avg.	0.0094			
49	0.0085	17.0	70° F	Added more water.
50	0.0070			
51	0.0080			
52	0.0075			
53	0.0075			
54	0.0070			
Avg.	0.0076			
55	0.0060	12	70° F	Added more water.
56	0.0055			
57	0.0050			
58	0.0050			
59	0.0050			
60	0.0055			
Avg.	0.0053			
61	0.0040	7	70° F	Added more water.
62	0.0030			
63	0.0040			
Avg.	0.0037			

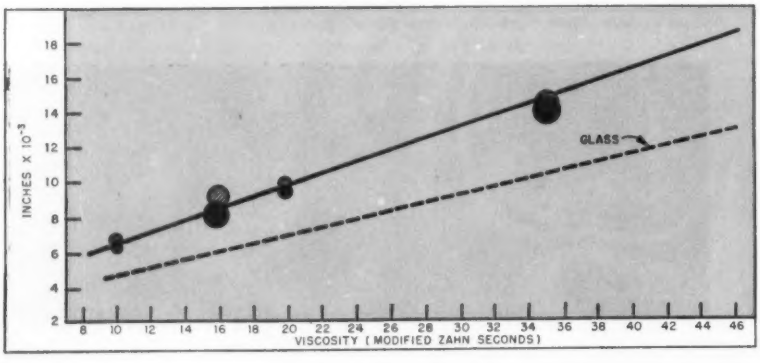


Fig. 5—Chart plots thickness of coating on wax as a function of viscosity of slurry

ployed viscosity scale (modified Zahn seconds), pure water has a value of about 6 seconds. Slides were dipped over the entire viscosity range from a very thick paste to a water-thin slurry.

Index of Precision — Whenever measurements of this kind are concerned, the question of precision must be faced. For example, variations in film thickness can be seen in Table I, but it is difficult to say whether these variations are significant or merely the result of random, indeterminant errors.

Slides 2 and 23 gave identical thickness values despite radical differences in past history. On the other hand, slides 5 and 24 seemed to show significant changes in thickness. What is needed, then, is an index of precision. It was with this thought in mind that six slides were dipped at one time.

The precision index employed was the standard deviation, σ, which is defined as $\pm\sqrt{\Sigma x^2/n}$ for any individual value and as $\pm\sqrt{\Sigma x^2/n^2}$ for the average value. The x stands for deviation from the mean (for Slide 1 this would be 0.0004), and the n stands for number of readings taken (in this instance, six).

Statistical theory tells us that an index of 0.670 represents a probability of 50 per cent that true value lies within the stated limits. An index of 3.00 conventionally is taken to represent a probability of almost 100 per cent that the true value lies within the stated limits.

When the values in Tables I and II were plotted in Fig. 3, circles were drawn carefully with radiuses equal to 3σ. This means there is very little chance that the true film thickness lies outside the circle. The circles drawn in succeeding figures have similar significance. The shaded circles are from Table I (constant viscosity) and the black circles from Table II (constant composition).

Fig. 3 shows that it is possible to draw a straight line through almost

all of the circles. This fact may be interpreted to mean that within the limits of the measurements employed, film thickness varies linearly with viscosity. Also, since the shaded circles fall nearly on the line, and all the values in Table I are within the shaded area, there is no detectable change in film thickness with composition or drying conditions. Film thickness is a function of viscosity only and does not depend on composition, aging, drying time, or drying temperature.

Pattern Material—Wax plates of surprising uniformity (0.050, ± 0.001 in.) were obtained and cut to the approximate dimensions of the glass slides. A sheet of $\frac{1}{8}$-in. polystyrene also was obtained and cut to resemble the glass slides. These wax and plastic slides were dipped in precoat with some glass slides for control.

Before the dipping, the wax slides were cleaned by being dipped in a solution of alcohol and a few drops of wetting agent. The plastic was packaged in protective paper, which was stripped off a few moments before the dipping. All slides were stored at the same temperature as the precoat slurry (70° F) before and after dipping.

Table III presents the results of the film thickness measurements on the dry precoat. The starting compositions and method of varying viscosity are identical to those reported in Table II. The coating on glass as a function of viscosity is plotted in Fig. 4. The results of the previous study on glass slides (Table II) are included to demonstrate the reproducibility of the method. As before, the circles are drawn with radiuses equal to 3σ. Since greater care was taken with the control slides this time, the precision obtained is reflected by smaller circles.

In Fig. 5, the thickness of coat on wax is plotted as a function of viscosity. The black circles were obtained by measuring the total thickness of the wax slide plus precoat, subtracting the thickness of the wax, and dividing by two. This gives the average thickness of coat as it did in the coated glass slides.

The shaded circles were obtained by measuring the individual thickness of each coat after it had been dewaxed and baked at 1400° F. The solid line has no significance other than to show that it is possible to draw a straight line through all the points, both after drying at room temperature and baking at 1400° F. A dotted line, showing the relative thickness of the coat on glass is also included.

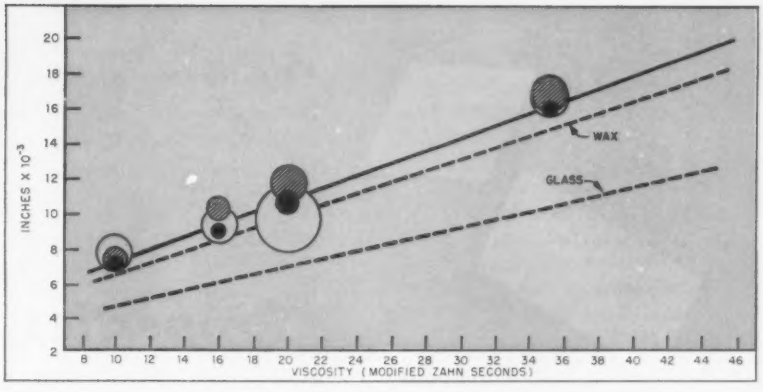


Fig. 6—Average values of coating thickness on plastic are plotted as large, open circles. Individual measurements are small, black circles

When the coated plastic slides were dried at 70° F, the precoat did not adhere tightly to the plastic. On many slides the coat was puckered and separated easily from the plastic. Average values of coating thickness are plotted in Fig. 6 (large, open circles). Because of the poor adhesion of the coat on the plastic, this method was not as precise as the measurement of the individual films, which peeled easily from the plastic. These individual thickness measurements are plotted as small, black circles in Fig. 6.

Comparing film thickness values for different pattern materials, one would conclude that identical precoats would not be received by different materials under identical conditions. For any given pattern material, however, there is a linear decrease of film thickness with viscosity. This thickness of coat is relatively insensitive to other variables such as composition and drying conditions. The shaded circles in Fig. 5 and 6 (thickness after baking at 1400° F) cannot be said to show any appreciable effect of their past thermal history.

TABLE III—Film Thickness vs. Pattern Material (70° F)

Slide No.	Thickness Of Coat On Glass (inch)	Thickness Of Coat On Wax (inch)	Thickness Of Coat On Plastic (inch)	Viscosity When Dipped	Remarks
1	0.0105	0.0145	0.0180	35.0 (Zahn-sec)	Individual films on plastic averaged 0.0162" when dried at 70° F and 0.0170" at 1400° F.
2	0.0090	0.0145	0.0160		
3	0.0080	0.0140	0.0170		
4	0.0100	0.0130	0.0165		
5	0.0085	0.0145	.....		
Avg.	0.0092	0.0141	0.0169		
6	0.0075	0.0090	0.0090	20.0	Individual films on plastic averaged 0.0107" when dried at 70° F and 0.0116" at 1400° F.
7	0.0070	0.0095	0.0075		
8	0.0075	0.0095	0.0115		
9	0.0075	0.0100	0.0110		
10	0.0070	0.0095	0.0100		
Avg.	0.0073	0.0095	0.0098		
11	0.0060	0.0090	0.0100	16.0	Individual films on plastic averaged 0.0090" when dried at 70° F and 0.0104" at 1400° F. Average film on wax at 1400° F was 0.0092".
12	0.0060	0.0085	0.0095		
13	0.0055	0.0080	0.0080		
14	0.0055	0.0075	0.0100		
15	0.0060	0.0075	0.0100		
Avg.	0.0058	0.0081	0.0095		
16	0.0045	0.0065	0.0060	10.0	Individual films on plastic average 0.0072" when dried at 70° F and 0.0074" at 1400° F.
17	0.0045	0.0065	0.0075		
18	0.0045	0.0065	0.0085		
19	0.0045	0.0065	0.0080		
20	0.0040	0.0060	0.0080		
Avg.	0.0044	0.0064	0.0076		

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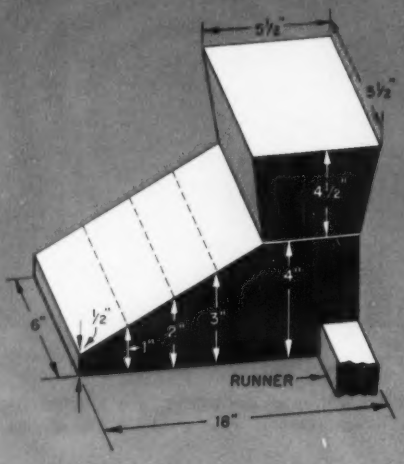


Fig. 2—For purposes of the investigation, wedge casting was made with sections from ½ to 4 in.

Properties of

COPPER-BASE ALLOY CASTINGS

This report on effects of casting section on properties of 88-10-2, 86-7-5-2, and 85-5-5-5 gunmetal, with and without nickel additions, was presented at the 1958 International Foundry Congress in Belgium

By F. HUDSON, D. R. WOOD, and J. F. GREGG
Mond Nickel Co.
London, England

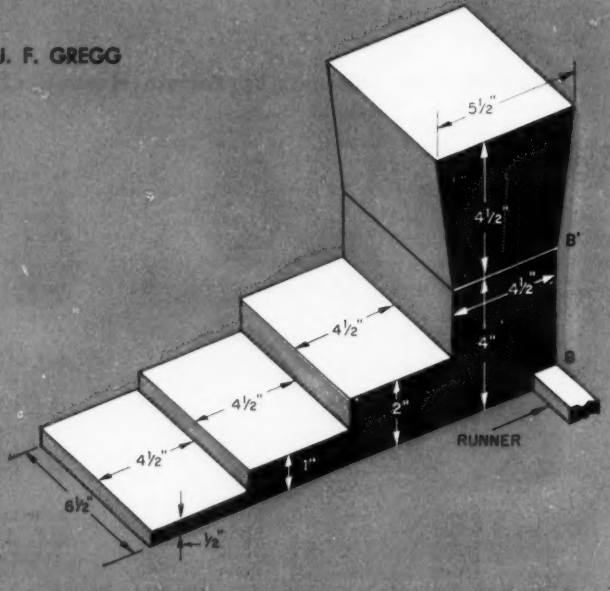


Fig. 1—Step-bar casting for investigation also includes sections from ½ to 4 in.

● A CERTAIN amount of work on section sensitivity has been done by foundries making alloy steel and light alloy castings for aircraft. The results not only have promoted new developments, but also have inspired greater confidence in the quality of castings. Very little information has been published, however, on the properties of castings in copper-base alloys.

It was decided to investigate the effects of casting section on the properties of 88-10-2, 86-7-5-2, and 85-5-5-5 gunmetal, with and without nickel additions.

Experimental Procedure — Step-bar and wedge-shaped castings were made with sections from ½ to 4 in. Two leaded gunmetals were chosen for examination, 85-5-5-5 and 86-7-5-2 copper-tin-zinc-lead alloys, each with nickel additions up to 4 per cent. Corresponding data were determined on 88-10-2 copper-tin-zinc alloy.

Seven 400-lb heats were melted by Phosphor Bronze Co., Birmingham, England, in oil-fired, tilting crucible furnaces, from prealloyed ingots of specific compositions, prepared from virgin metals.

Nominal compositions were such that zinc and lead were held constant in each group of three heats, and combined tin plus nickel contents were not to fall significantly outside the limits for tin contents laid down by B.S.S. 1400.

The heats were degassed with nitrogen for 10 minutes at 1250° C and deoxidized before pouring with 0.01 per cent phosporous, added as phosphor-copper. From each heat, three keel-type bars with a keel portion 8 in. long by 1¼ in. square were cast at 1150-1160° C, and a step-bar (Fig. 1) and a wedge casting (Fig. 2) were cast at 1125-1135° C.

In all instances, naturally bonded, dry sand molds were used. The step bars and wedges were bottom-run through the 4-in. section, and the keel-type bars were run similarly through one end of the keel portion. An exothermic feeding compound was applied to all feeder heads.

Tensile and Izod impact test pieces and sections for macroexamination were sawed from the castings at points indicated in Fig. 3 and 4. From sections up to 2 in. thick, samples for hardness and density determinations and for microexamination were prepared from the unstrained ends of broken tensile test pieces.

Corresponding samples from thicker sections were prepared from slices sawed from the castings at positions adjacent to the sections used for macroexamination. Data were obtained from ½, 1, 2, and 4-in. thick sections of both step bars and wedges and, in addition, from 3-in. sections of the wedges. Samples from the "top" location of the 4-in. sections were found to give erratic results, believed to be due to gross shrinkage porosity. These were not examined further.

Experimental Results—Results of tensile, hardness, Izod impact, and density measurements are given in Fig. 5-15.

Separately cast test bars of all the low-nickel alloys satisfy the minimum tensile strength requirements of B.S.S. 1400 by a small margin, and the elongation values meet the specification requirements more comfortably. In the following notes, comment is made on implications of the data in the charts.

85-5-5-5 LEADED GUNMETAL

Mechanical Properties—Ultimate tensile strength, 0.1 per cent proof stress, and elongation fall steeply with increasing section size. These effects are more pronounced in the step bar than in the wedge (Fig. 5-8). The fall in properties clearly is associated with the incidence of

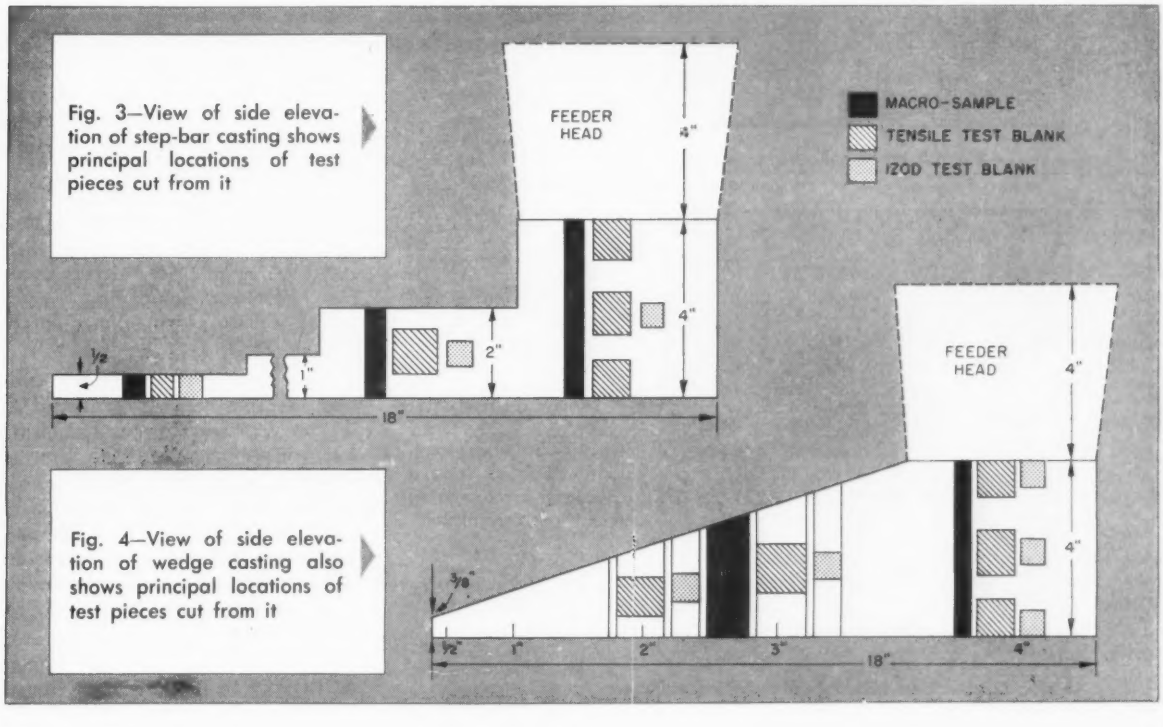


Fig. 3—View of side elevation of step-bar casting shows principal locations of test pieces cut from it

Fig. 4—View of side elevation of wedge casting also shows principal locations of test pieces cut from it

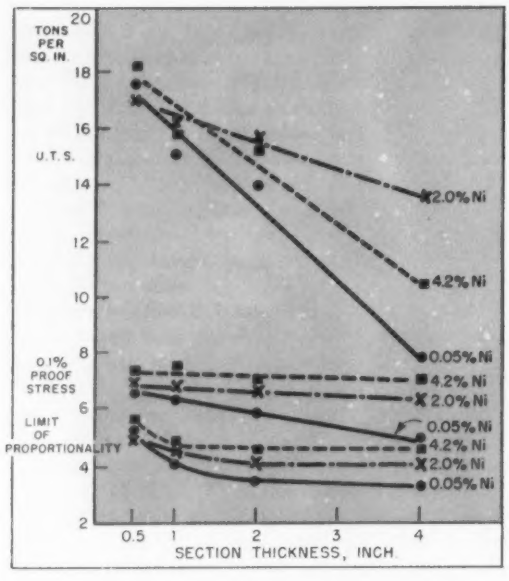


Fig. 5—Step-bar castings, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel

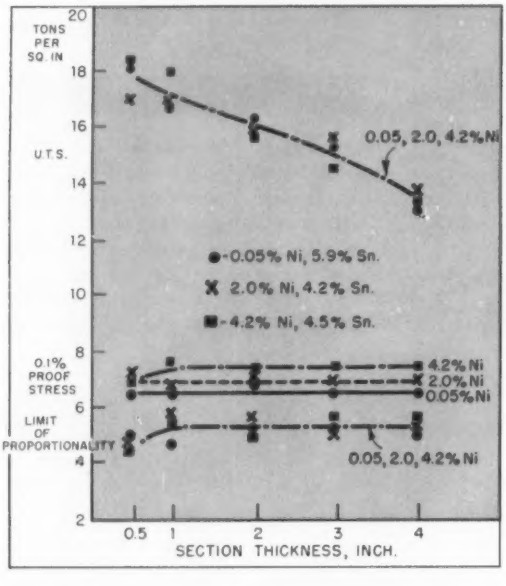


Fig. 6—Wedge casting, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel

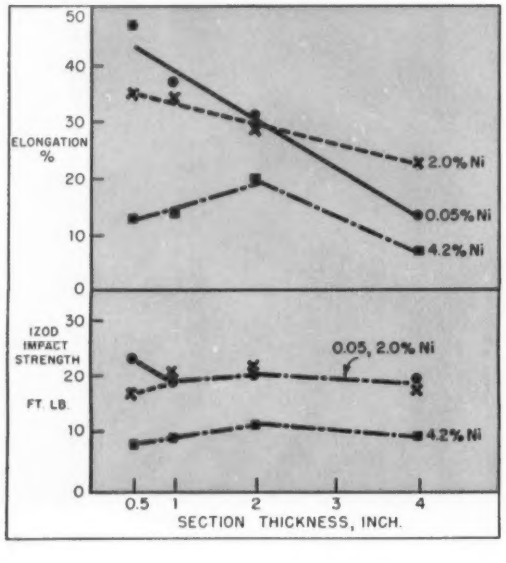


Fig. 7—Step-bar castings, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel

unsoundness, revealed by density measurements (Fig. 9-10). The step bar apparently is fed less readily than the wedge.

It is noteworthy, however, that the step bar casting of the alloy containing 2.0 per cent nickel and 4.2 per cent tin shows a less drastic fall in tensile strength with increasing section size than the one containing 0.05 per cent nickel and 5.9 per cent tin. Moreover, density measurements (Fig. 9) show that the 2.0 per cent nickel-alloy casting was uniformly sound.

Results indicate that although additions of nickel have only minor effects on the tensile strength of a perfectly fed casting, replacement of 1.7 per cent tin by 2.0 per cent nickel enhances the uniformity of both density and tensile strength in an inadequately fed casting.

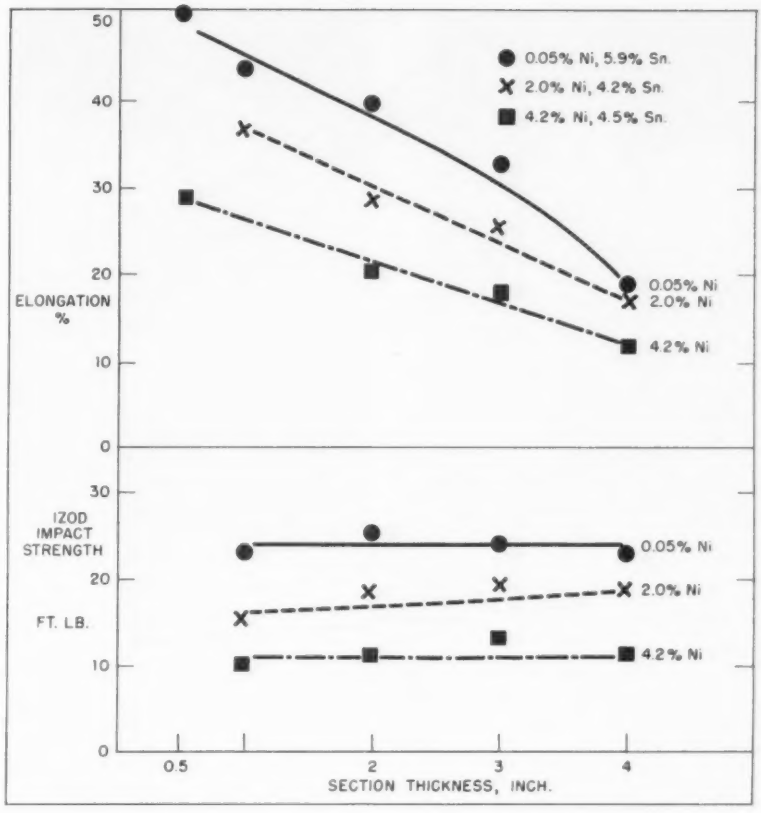
The effects are such that the ultimate tensile strength of the 2.0 per cent nickel alloy in a 4-in. section was 13.5 tsi for the step bar and the wedge (Fig. 5 and 6). Corresponding value for the nickel-free step bar was 7.8 tsi. A similar improvement was effected in the 0.1 per cent proof stress. Respective values obtained were 6.4-6.8 tsi in comparison with 4.9 tsi.

Changes in composition have somewhat smaller effects on elongation values. Results under discussion show that the ductility of 2.0 per cent nickel alloy is not significantly different from that of the lower-nickel alloy.

Judged by the wedge casting (Fig. 8 and 10), impact strength and hardness show little variation with change in section thickness. The 2.0 per cent nickel alloy has a mean impact strength of approximately 17 ft-lb, compared with 23 ft-lb for the low-nickel material. The corresponding mean hardness values are approximately 75 and 72 Bhn.

In general, higher nickel content (4.2 per cent) is beneficial to 0.1 per cent proof stress, but exerts less effect on ultimate tensile strength (Fig. 5) and is detrimental to elongation and impact strength (Fig. 7 and 8). On balance, the properties of such an alloy represent no improvement over the lower-nickel composition, but the 4.2 per cent nickel step bar shows uniform density similar to that of the 2.0 per cent nickel

Fig. 8—Wedge castings, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel



alloy. Both higher-nickel compositions are markedly superior to the lower-nickel alloy.

Macrostructure—The macrostructures shown in Fig. 14 are typical of all six castings. Striking features are the very fine grain (1-4 mm) of the ½-in. section, the large grain (2-15 mm) of the 1 and 2-in. sections, and the slightly smaller grain of the 4-in. sections (2-10 mm). Grain size varied widely in the 1, 2, and 4-in. sections. No consistent relationship is apparent between the grain size revealed by macroexamination and any of the mechanical properties described above.

Microstructure — Microporosity was present in the low-nickel step bars (Fig. 18 and 19), but virtually absent from the corresponding wedges (Fig. 20 and 21). Lead particles visible in the 4-in. section of the step bar were coarser than those in the corresponding section of the wedge. Those in the 2.0 per cent nickel alloys were finely distributed and showed a serrated habit (Fig. 22). Substantial precipitation of theta phase (Fig. 23) was found in the 4.2 per cent nickel alloy, and delta eutectoid was present, in very small amounts, in 4-in. sections of both the low-nickel castings.

86-7-5-2 LEADED GUNMETAL

Mechanical Properties—Data for the 86-7-5-2 alloys are incomplete, due to the absence of a low-nickel wedge casting, but there is evidence that some of the effects noted for the 85-5-5-5 alloy occur also in the 86-7-5-2. In the 4-in. step bar section, the ultimate tensile strength of the alloy containing 2.2 per cent nickel and 6.2 per cent tin is slightly higher than that of the lower-nickel alloy.

It should be noted, however,

Fig. 9—Step-bar castings, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel

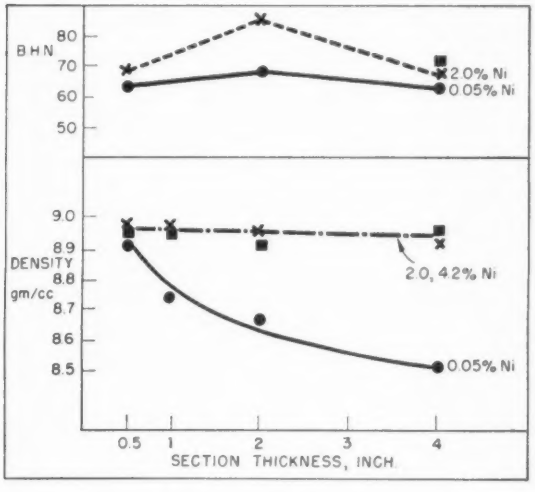
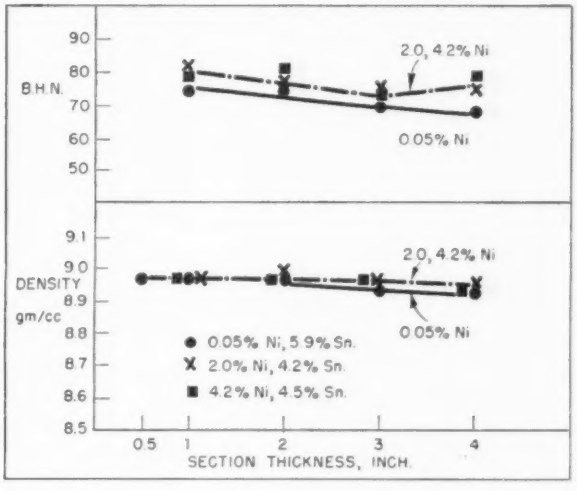


Fig. 10—Wedge castings, 85-5-5-5 leaded gunmetal containing up to 4.2 per cent nickel



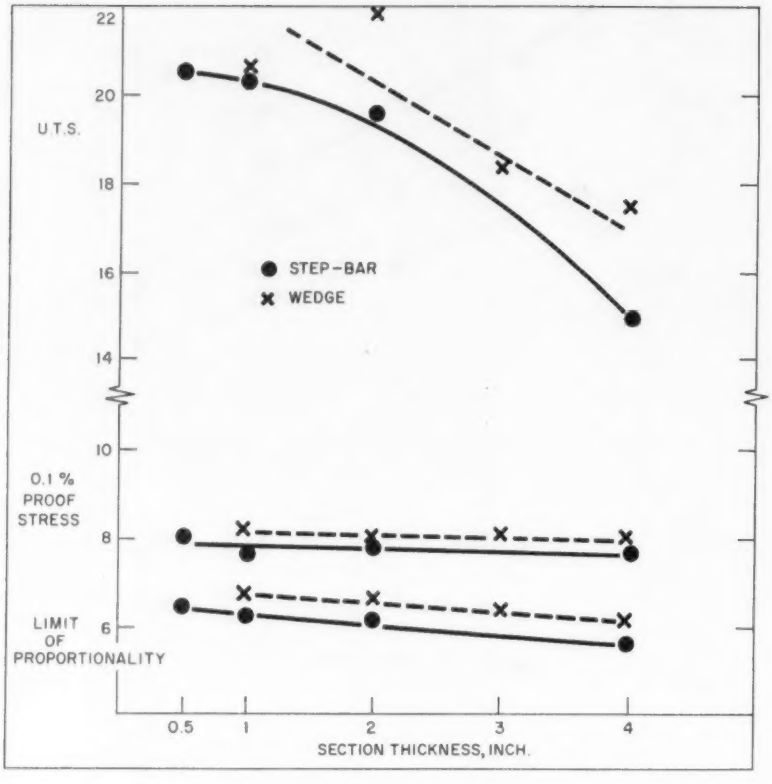


Fig. 11—88-10-2 admiralty gunmetal

that mechanical properties of the lower-nickel alloy (GEVH) are much higher than those normally obtained from 86-7-5-2 gunmetal because of the excessively high tin content (9.1 per cent). Further replacement of tin by nickel is less beneficial.

It is of interest that at heavier section thicknesses none of the step bar castings has ultimate tensile strength properties as high as those of the wedges. Density measurements reveal that the low-nickel step bar becomes increasingly unsound with increasing section thickness. This unsoundness is only partially offset by nickel additions.

Macrostructure — No correlation was observed between mechanical properties and macrostructure. For example, the 2.2 per cent nickel-containing step bar (Fig. 16) was relatively coarse-grained compared with the lower-nickel alloy (Fig. 15), but there were no corresponding differences in tensile strength.

Microstructure — Compared with the 85-5-5-5 alloys, the low-nickel castings showed greater amounts of delta eutectoid, and the higher-nickel alloys showed greater amounts of theta phase. Coarseness of both lead particles and delta eutectoid or theta phase increased with section size.

88-10-2 GUNMETAL

Mechanical Properties—Step bar and wedge castings gave closely similar results for all mechanical properties measured. Ultimate tensile strength, elongation, impact strength, and density all fell markedly with increasing section size; the only properties not reduced greatly were limit of proportionality, 0.1 per cent proof stress, and hardness (Fig. 11-13).

In general, the wedge castings were slightly more sound than step-bar specimens (Fig. 13), and showed higher strength, elongation, and impact properties (Fig. 11 and 12).

Unlike the other alloys, the 88-10-2 separately cast test bars gave certain properties of an order simi-

Fig. 12—88-10-2 admiralty gunmetal

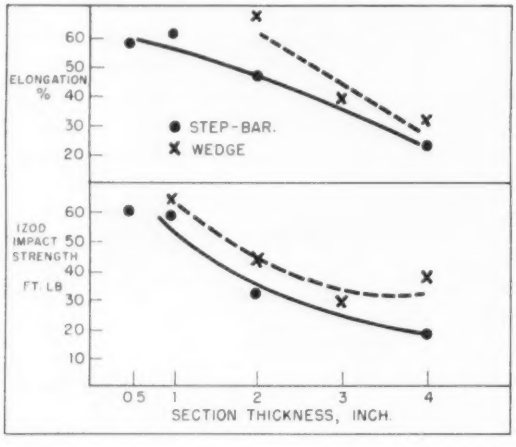
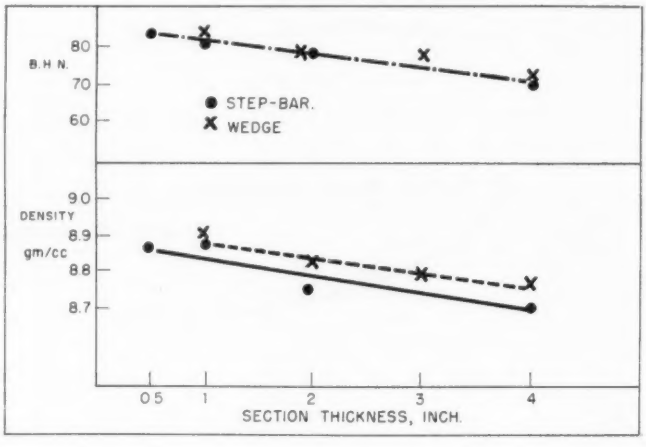


Fig. 13—88-10-2 admiralty gunmetal



lar to those obtained from the step-bar and wedge castings at a similar section thickness (1¼ in.). Limit of proportionality and 0.1 per cent proof stress, for example, were similar, and ultimate tensile strength was slightly lower. Elongation and impact strength were, however, significantly lower than for the step-bar and wedge castings.

Macrostructure—The macrostructures (Fig. 17) showed fine grain (1-3 mm) in ½-in. section, coarse grain (3-8 mm) at 1 in., widely varying grain size (1-10 mm) at 2 in., and somewhat more uniform grain (3-8 mm) at 4 in.

Microstructure—In the ½-in. sections, microstructures of both castings showed small amounts of gas porosity and delta eutectoid. Amounts of porosity and eutectoid increased markedly with section size (Fig. 24).

Conclusions — The above tests (on castings varying in section from ½-in. to 4-in.) lead to the following major conclusions:

1. Composition has an important bearing on sensitivity of gunmetal alloys to section thickness. Room-temperature tensile strength and percentage-elongation values of three commonly used gunmetals—85-5-5-5, 86-7-5-2, and 88-10-2—cast in dry sand molds fall markedly with increasing section thickness.

The rate of fall of these properties is greater in a step-bar casting (a shape difficult to feed effectively) than in a wedge of similar dimensions. Further, the rate of fall in properties is greater as the tin content in the alloys is decreased and as the lead content increases.

2. A step-bar casting in an alloy of the 85-5-5-5 type containing 2.0 per cent nickel and 4.2 per cent tin was substantially free from microporosity. A 4-in. section thickness showed 0.1 per cent proof stress, ultimate tensile strength, and percentage elongation similar to those of the more easily fed wedge casting.

The addition of nickel resulted also in finer, more uniform dispersion of lead particles. A larger addition of nickel (4.2 per cent) in the presence of 4.5 per cent tin was slightly beneficial to tensile strength, but deleterious to percentage elongation and Izod impact strength.

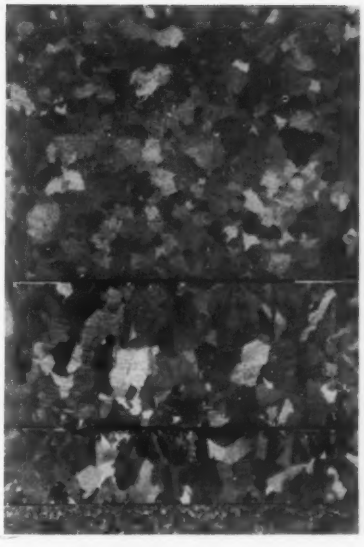


Fig. 14—Heat P5. Macrostructures of 85-5-5-5 gunmetal step-bars

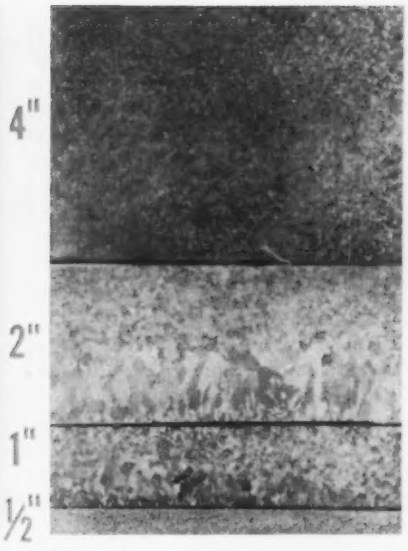


Fig. 15—Heat P2. Macrostructures of 86-7-5-2 gunmetal step-bar (0.1% Ni)

Somewhat similar results were obtained from 86-7-5-2 castings containing up to 3.1 per cent nickel, but the trends were less well defined.

3. The results imply that although 88-10-2 gunmetal in both ½ and 4-in. sections has higher ultimate tensile strength and percentage elongation than 85-5-5-5 leaded gunmetal, at 4-in. thick sections an addition of 2 per cent nickel to the leaded alloy offsets almost all the advantage of the 88-10-2 composition. The rates of fall of properties with increasing section size suggest that a nickel-containing, leaded gunmetal might have tensile strength and ductility superior to those of the 88-10-2 alloy at section thicknesses greater than 4 in.

4. Poor correlation was obtained between the properties of separately cast bars of 1¼-in. section and those of test bars cut from the step bars and wedges.

It is of interest that separately cast test bars of all the alloys studied gave properties markedly

Fig. 16—Heat P3. Macrostructures of 86-7-5-2 gunmetal step-bar (2.2% Ni)

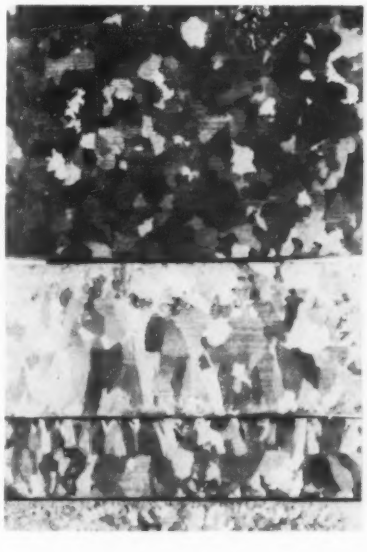
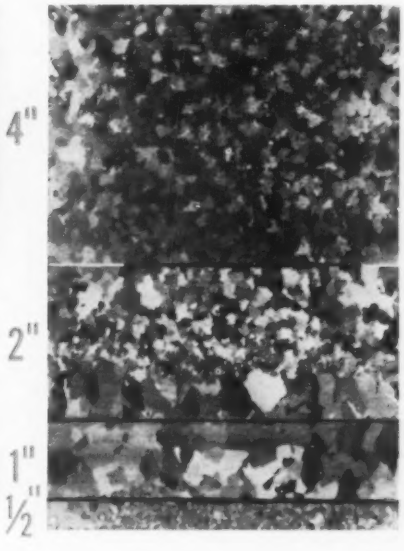


Fig. 17—Heat P1. Macrostructures of 88-10-2 gunmetal step-bar



different from those of sections of similar thickness (1¼ in.) sawed from the step bar and wedge castings. To some extent the test bar properties correspond to somewhat thicker sections of the step bars, but the correlation is poor. The separately cast, low-nickel 85-5-5-5 gunmetal bars show a mean ultimate tensile strength value of 13.5 tsi, equivalent, to a step-bar thickness of 2 in. (Fig. 4).

The separately cast test bars of the corresponding 2.0 per cent nickel alloy, however, give a mean ultimate tensile strength of 8.8 tsi, which is lower than any value obtained from test bars cut from step-bar or wedge castings of similar composition.

The investigation shows no evidence of any clear-cut relationship between macrostructure and properties. Within certain limits, however, properties appear to depend on the amounts of delta eutectoid or theta phase present in the microstructure. In this connection, the combined tin plus nickel content governs the amounts of these phases, and tin plus nickel more than about approximately 7-8 per cent results in precipitation of massive eutectoid or theta phase. The precise limits also depend on the lead content of the alloy. These structures, which favor poor mechanical properties, are enhanced by heavy section thicknesses.

ADDITIONAL DATA

Aluminum Bronze and High-Tensile Brass — For aluminum bronze and high-tensile brass, the information available is more extensive. Castings in these alloys have to operate under more highly stressed conditions than those to which the tin-bronzes and gunmetals are subjected. Consequently, founders and engineers in the United Kingdom who make cast components in these alloys have found it necessary to obtain a fairly accurate assessment of their properties.

This task has been accomplished by cutting test bars from actual castings, varying in size from small diecastings with ⅜-in. maximum section, to marine propellers, weighing several tons, with sections up to 6½ in. thick. Some of the results obtained from high-tensile aluminum bronze are plotted in Fig. 25.

The percentage elongation in sections 6 in. thick is about the same as that which can be obtained from separately cast test bars.

The tensile strength is approximately 90 per cent that of a separately cast bar. Aluminum bronze is remarkably free from microporosity in heavy sections. In rapidly cooled sections less than 1 in. thick, tensile strength may be much higher than that normally required by specifications, although there may be some sacrifice of ductility.

Test pieces cut from marine propeller castings indicate that tensile strength and elongation of high-tensile brass in sections 7 in. thick are of the order of 80 per cent of those obtainable from separately cast test bars. Slight microporosity was present in all cases.

GENERAL CONCLUSIONS

From the information available, it would appear that alloys with a short freezing range, such as aluminum bronze and high-tensile brass, are not unduly sensitive to the effect of section thickness and that castings can be produced in these alloys with mechanical properties approaching those obtainable from separately cast test bars. In alloys with a long freezing range, such as tin-bronze and gunmetal, properties of castings may vary widely with section thickness and be unrelated to those obtained from separately cast test bars.

It is evident that composition has an important bearing on the section sensitivity of gunmetal alloys. In 85-5-5-5 leaded gunmetal castings, mechanical properties in thick sections are reduced seriously by the presence of massive grain-boundary lead segregates as well as by a variable amount of microporosity. The addition of 2.0 per cent nickel, however, promotes finer dispersion of the lead particles and a much more nearly uniform, higher level of properties in castings of varying section.

All the standard gunmetals in use today have been evolved by trial and error, and, as a result of systematic study, compositions may have to be modified to improve casting quality. From a study of the data in this paper, it is evident that none of the existing standard gunmetals is capable of providing the ideal combination of properties needed for the production of quality castings—namely, a uniformly high

Fig. 18—Microstructure of 85-5-5-5 gunmetal step-bar, 1-in. section, showing lead particles and microporosity (0.05% Ni). Magnification, X75

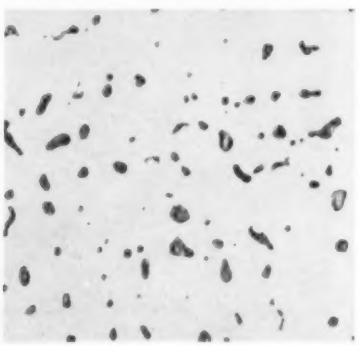


Fig. 19—Microstructure of 85-5-5-5 gunmetal step-bar, 4-in. section, showing coarse lead particles and microporosity (0.05% Ni). X75

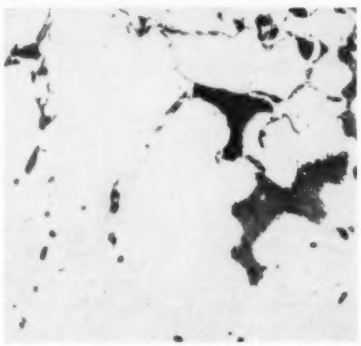
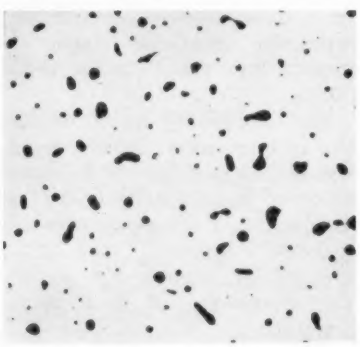


Fig. 20—Microstructure of an 85-5-5-5 gunmetal wedge casting, 1-in. section, showing lead particles (0.05% Ni). Magnification, X75



level of strength, ductility, and pressure tightness in castings of variable section.

It can be postulated that an alloy containing about 6-7 per cent tin, 3-4 per cent zinc, 3-4 per cent lead, 1½-2½ per cent nickel, and the balance copper may provide this ideal. Such an alloy would be easy to handle in the foundry and would be better suited for the production of quality castings than any of the standard gunmetals in use today. It probably could replace the 88-10-2, 86-7-5-2, and 85-5-5-5 alloys.

Gunmetal castings in this modified composition would be less sensitive to the effect of casting section and if properly made should have a tensile strength of not less than 16 tsi. They will be just as adaptable as 85-5-5-5 gunmetal to the production of pressure-tight castings, and they are likely to have improved properties at elevated temperatures. Furthermore, the use of such an alloy undoubtdly would permit more effective design of castings, particularly as regards the use of thinner sections. This factor could result in a considerable saving in weight. In the valve industry alone, it might lead to substantial savings.

Before definite recommendations can be made, further work will have to be done on the effect of pouring temperature, cooling rate, etc., and creep properties at elevated temperatures will also have to be determined. Considerable quantities of gunmetal castings of less than ½-in. section are used to meet many industrial requirements. It is, therefore, particularly important that a study be made of the effect of rapid cooling rates on the properties of such alloys.

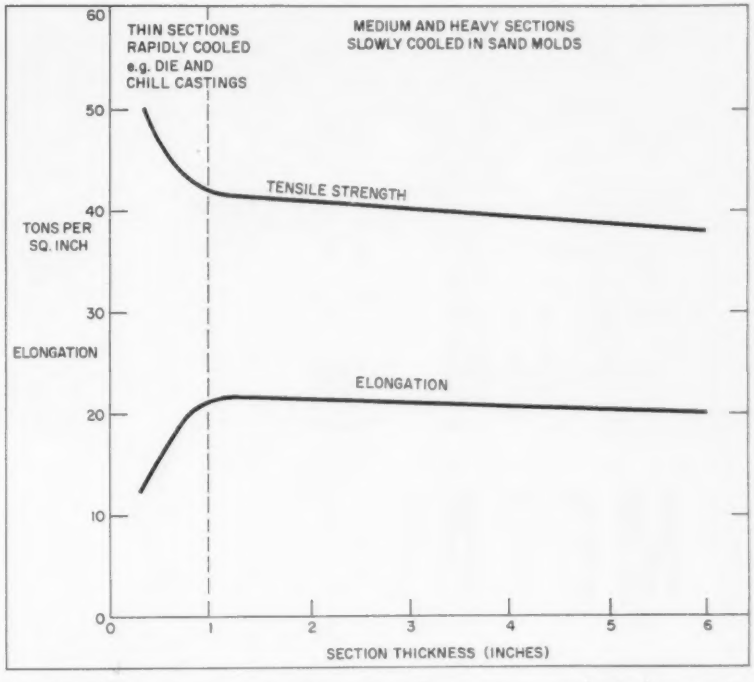


Fig. 25—Effects of casting section and cooling rate on mechanical properties of high-tensile aluminum bronze containing 9.5% Al, 5.0% Ni, and 5.0% Fe

Acknowledgments — In conclusion, the authors take this opportunity of expressing their thanks to the Phosphor Bronze Co. for cooperation in making the experimental step-bar and wedge castings and to the Mond Nickel Co., London, for permission to publish the results of the investigation reported in this paper.

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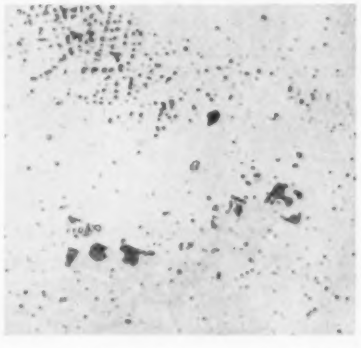


Fig. 24—Microstructure of 88-10-2 gunmetal step-bar, 4-in. section, showing interdendritic porosity

Fig. 21—Microstructure of an 85-5-5-5 gunmetal wedge, 4-in. section, showing coarse lead particles (0.05% Ni). Magnification, X75

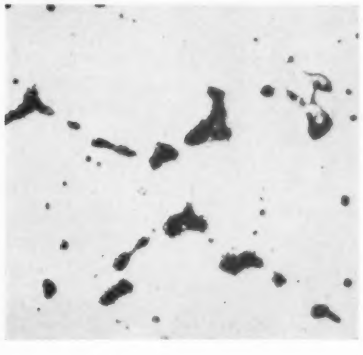


Fig. 22—Microstructure of an 85-5-5-5 gunmetal wedge, 4-in. section, showing serrated lead particles (2.0% Ni). Magnification, X75

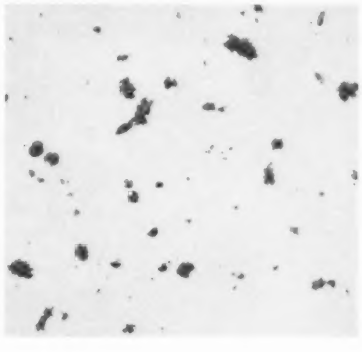
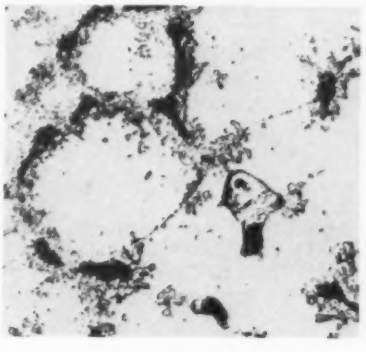


Fig. 23—Microstructure of 85-5-5-5 gunmetal step-bar, 4-in. section, showing lead particles and theta phase (4.2% Ni). Magnification, X100



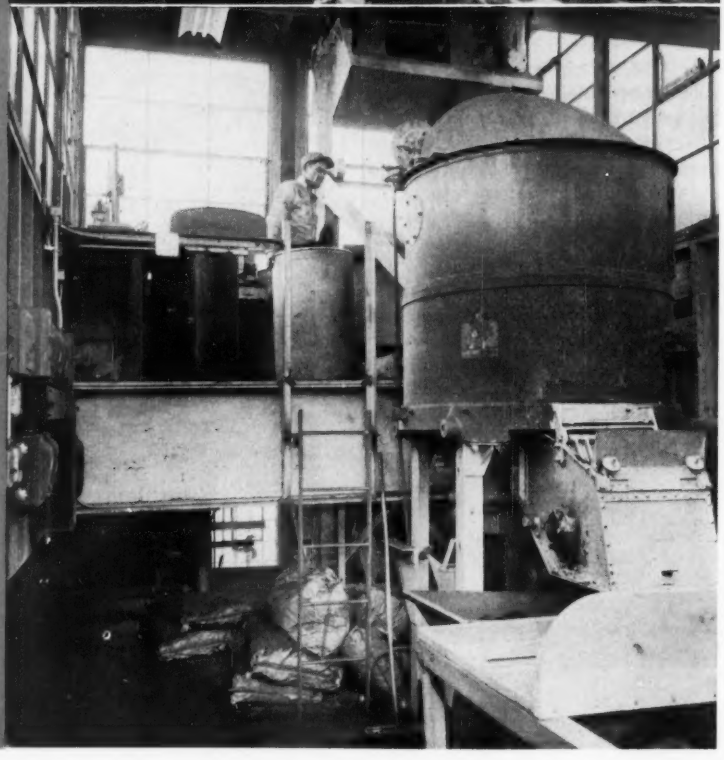
Setting cores in mold on molding machine. Molding machines are set in pits 16 in. deep. They alternately face in opposite directions to save space

Nonferrous Foundry Uses

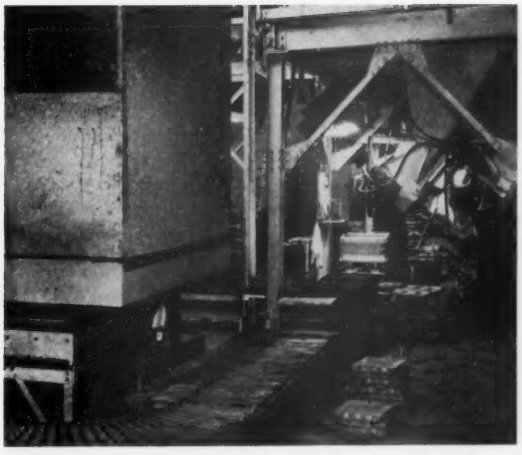
SAND and METAL MOLDS

This progressive foundry three years ago expanded its market by building a new foundry for diecast zinc parts and permanent mold aluminum castings, then doubled production of castings at its small, well laid-out sand shop with a new sand system

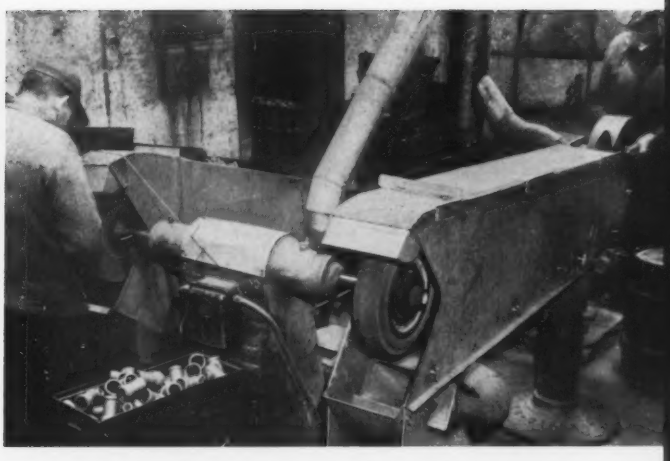
By ROBERT H. HERRMANN
Associate Editor



Man on deck of molding sand preparation center controls that operation. He makes additions, tests sand, and wheels it to openings over hoppers



View of mold conveyor line. Molding machines are at right, sand return storage bin at left



Sand castings are ground on floor stand abrasive belt wheel and platen machines

● GROWTH of foundry operations at B.F. & S. Bronze Foundry Co. has developed in two directions.

On one hand, recent installation of an overhead sand system has doubled capacity of the 16-year-old Brooklyn, N. Y., foundry. Over 80 per cent of castings it produces are brass and bronze, the balance being aluminum.

On the other hand, customer demand in recent years led the company to the conclusion that its market could be increased by offering die and permanent mold castings. About three years ago two of the bronze foundry officers joined with two other men to form Seaboard Diecasting Corp., in West Islip, Long Island.

The two companies, having common officers in Larry Shifman, president, and Ernest Riedel, treasurer, now offer a range of brass, bronze, and aluminum sand castings, aluminum permanent mold castings, and zinc diecastings weighing from 2 oz to 15 lb. The sand foundry produces parts for the plumbing goods, hardware, clothes pressing machinery, and refrigeration equipment industries, as well as decorative castings. Diecastings and permanent mold castings include electrical parts; trim, furniture, and builders hardware; record player parts, and cookware.

Sand Foundry—All foundry operations, including coremaking and cleaning, are conducted in an area of about 50 x 100 ft. An adjoining machine shop and inspection, shipping, and receiving departments cover an area of about 25 x 100 ft. Total employment during capacity operation is 35. Melting capacity is 15,000 lb per day. The foundry is well designed for maximum utilization of space. Castings and other materials in process must be moved only short distances, but handling equipment is used wherever possible.

The new molding sand system is situated on a mezzanine over the molding area. Because the roof of the original building is low, a rectangular opening had to be cut out to provide for construction of the sand preparation room. It extends about 10 ft above the old roof and is enclosed on four sides with glazed sash, providing plenty of light and ventilation.

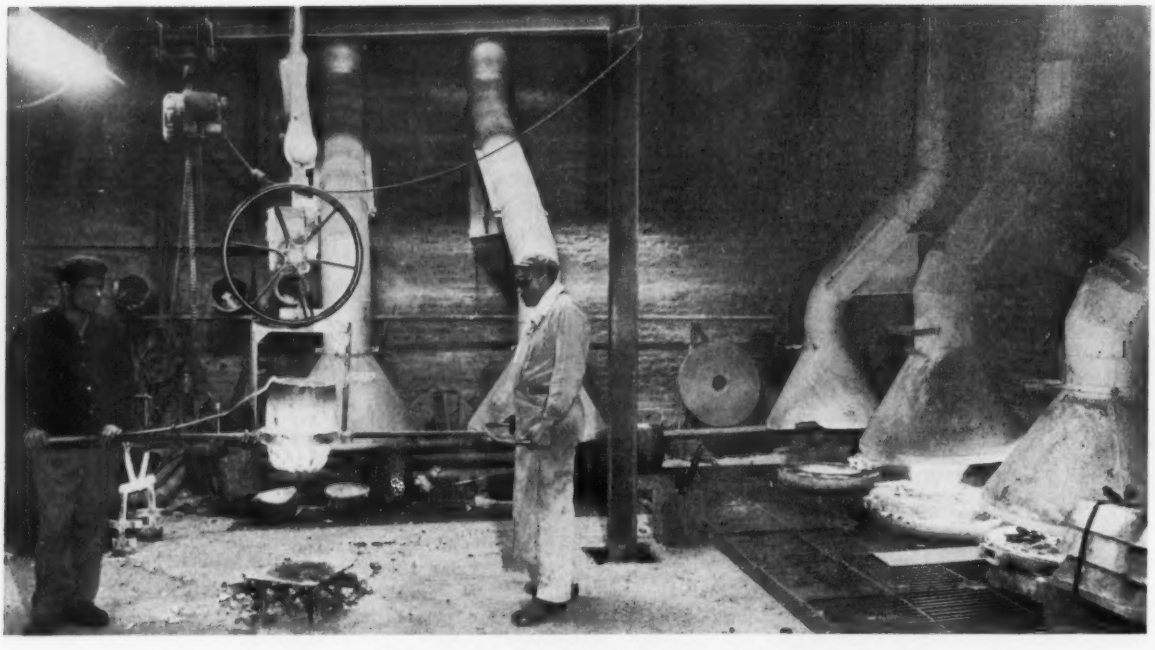
A skip hoist which receives sand at main floor level from a storage bin equipped with a screened, vibrating feeder at the bottom, brings the sand to mezzanine level. The muller operator at this point adds bentonite and cereal by volume measurement. The load is dumped into the muller and water added there.

The same man performs sand tests with equipment stationed on the mezzanine. Sand properties are 6-10 psi green compression strength, 22-28 permeability, and 2.5-5.0 per cent moisture. Prepared sand is discharged to a wheeled, drop-bottom bucket which is rolled to any of five grated deck openings above hoppers supplying molding stations.

Molding Department — Molding is done with matchplate patterns in wooden snap flasks on five jolt-squeeze machines. These machines are mounted in 16-in.-deep pits to provide room, because of the low ceiling, for the overhead sand hoppers. Although the machines are in a line, alternate units face in opposite directions. The operators of three machines set molds off to one gravity roller conveyor; the other two operators set molds off on a parallel conveyor.

The conveyors curve around through a switch to a single conveyor which loops around the flask storage area, sand storage bin, and skip hoist serving the muller. Molds are poured on this conveyor from a ladle suspended from a hand-pushed dolly on an overhead monorail. Outside this conveyor loop and along a wall of the building is a storage rack for matchplate patterns. They are hung from rods on the rack, neatly cataloged by number, and readily available.

Poured molds are hand-dumped to a vibrating combination screen-pan conveyor. Sand goes off the pan segment on the bottom to an inclined cleated belt conveyor which discharges to the storage bin. Castings and gating metal are picked off the screen and loaded into a dump bucket suspended from a hand-pushed trolley on an overhead monorail which cuts across the mold conveyor between two molding machines and dead-ends at the door of an airless blast tum-



Furnaces in melting section of the sand foundry include three oil-fired and two gas-fired, pit-type, crucible furnaces, all served by a jib crane

bling machine. The castings are dumped in.

Cleaned castings are dumped to the floor and shoveled to a metal table next to a band saw or to a similar table serving a power shear. Casting and gating metal are segregated into tote boxes. Boxes of castings are pushed along a waist-high roller conveyor to a small cleaning room equipped with a double-end belt grinder and a pedestal grinding wheel. Cleaned castings are trucked to the adjacent machine shop for finishing.

Melting Furnaces—Boxes of gating metal are pushed along a floor-level roller conveyor to the melting area. Here brass and bronze are melted in three oil-fired and two gas-fired pit-type crucible furnaces arranged L-shape around a jib crane. A trolley-mounted hoist rolls on the beam of the jib and is used to load and unload the furnaces. A gas-fired tilting pot furnace in the melting area produces 400-lb melts of aluminum.

Cores are produced on two blowers in a small room adjacent to the melting area. A turntable immediately behind the blowers carries cores in and out of an electric induction furnace on a three-minute cycle. Ninety-five per cent of core production is on these machines. The sand mix used for these cores contains a resin binder, cereal, kerosene, and water. A small muller in a corner of the room prepares sand mixes. Short run and unusual cores are made with an oil-sand mix. These cores usually are rammed by hand on a small bench and dried in a small gas-fired oven.

Coreroom equipment in the sand foundry includes two blowers and a turntable behind them which carries cores in and out an electric induction furnace

Metal Mold Foundry—Seaboard's permanent mold and diecasting facilities are housed in a modern, well lighted and ventilated building constructed on 30,000 sq ft of ground in a relatively sparcely populated section of Long Island. Production capacity is 25,000 lb of castings daily in the 60 x 200-ft building. President Shifman considers one of the company's greatest assets to be the design and development team of Harry Costello on dies and Vincent Karaktin on permanent molds. Both are well known in the field.

Permanent molding operations are concentrated at one end of the plant. Aluminum alloys 108, 195, and 356 are poured in hand-operated, hand-clamped Meehanite molds kept at approximately 700° F. Most of the molds are made by outside firms to Seaboard's specifications, although plant facilities include a machine shop for construction of simple molds and repair and maintenance work.

CO_2 cores are used in some molds. Cores are quite simple and are hand rammed at a bench. Other

requisite equipment includes a small muller and a cup and hose arrangement attached to a cylinder of CO_2 for gassing.

Metal is melted in two gas-fired, reverberatory, ladle-out furnaces of 600-lb capacity each and one 150-lb capacity gas-fired pot furnace. All are equipped with vent hoods. Operators pour castings, remove them from the molds with tongs, and set them in tote boxes which are hand-trucked to the cleaning area. Here gating metal is removed by band saw and castings are ground on floor stand, abrasive belt wheel and platen machines. When specifications require it, bench workers finish castings, often in jigs, with hand tools. Some castings also are stress relieved in a small gas-fired oven at 450° F for about 4 hr.

Diecasting — Production here is confined to zinc castings. Facilities include a line of four, 60-ton, hot chamber, automatic injection impact machines which handle dies measuring up to 6 x 9 in. and have a 14-oz shot capacity. A 500-lb capacity gas-fired pot furnace supplies metal for these machines.

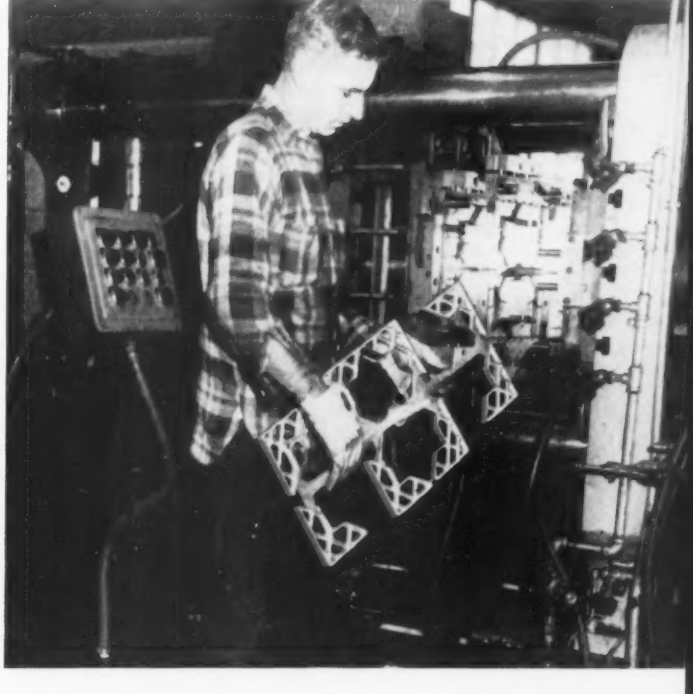
Larger equipment includes a 100-ton machine which handles dies up to 13 x 16 in. and has a 7-lb shot capacity and a 600-ton machine with 24 x 24-in. die and 12-lb shot capacities. These are goose neck, automatic injection machines. Metal for these machines is provided by a 1200-lb capacity gas-fired pot furnace. Hardened tool steel dies used on these units are produced by outside die shops.

Depending on size, castings are stacked on skids or in tote boxes. Hand or power trucks transport the loads to the cleaning department. Workers break gating metal off some castings, use electric trimming presses or tumbling machines for gate removal on others. Some grinding, drilling, tapping, and countersinking is done on certain castings.

● For an extra copy of this article, until supply is exhausted, use card on Page 53

Aluminum alloys 108, 195, and 356 are poured in hand-operated, handclamped Meehanite permanent molds kept at approximately 700° F

All diecasting production is in zinc. Facilities in this department include six machines, four 60-ton, one 100-ton, and one 600-ton



Operators are performing grinding operations on castings from the metal mold foundry

Questions and Answers

Blowholes and pinholes as well as slag inclusions are main problems in investment casting operation . . . Production of castings with abrasive facing . . . High strength plaster or gypsum used for molds . . . Matchplate manufacture

Investment Casting Problem

We have a small investment foundry in Japan and are producing miscellaneous low and high-alloy steel castings. Metal is melted in a small indirect arc furnace lined with a mixture of 25 per cent each of coarse and fine grain magnesia, 25 per cent coarse and fine aluminum oxide, and 25 per cent recovered refractory. These materials are mixed with a small quantity of sodium silicate. The mold is mounted on top of the furnace and is filled with metal by inverting the furnace.

One difficulty we have is with blowholes and pinholes in the low-carbon steel castings. Hydrogen contents of two molten steel alloys as determined by a vacuum analyzer are 4.55 and 5.06 cc/100 g (0.36 and 0.40 relative volumes). These figures are only about 1 cc (0.0786 relative volume) higher than those in steel melted in an induction furnace and 3-ton direct arc furnace, and we do not think the hydrogen levels would cause the blow or pinholes. We have tried deoxidation with various materials such as FeSi, CaSi, FeZr followed by aluminum additions up to 1 per cent without notable improvement. Another difficulty is slag inclusions and slag adherence with all types of steel.

Your problems of blowholes and pinholes and of slag probably arise from different causes, although there is a possibility that the furnace lining may bear some responsibility in that it might be a source of hydrogen and slag.

The hydrogen values you mention (0.36 and 0.40 relative volumes) are somewhat higher than data given by Carter in *Electric Furnace Proceedings*, 1949, which indicated 0.11 to 0.35 relative volumes for carbon steel. In the case of high-alloy steels the values ranged from 0.42 to 1.01 relative volumes. There is no definite information, however, on what the limiting or critical value might be.

Carter mentions that it might be over 0.40 relative volumes in the case of some types of steel, but states that in the case of the high-alloy steels with 0.42 to 1.01 relative volumes no gas porosity was found. Hence, we agree that the blowholes and pinholes arise from some cause other than hydrogen in the metal.

Possible trouble spots include incomplete burn-out of the molds during the processing operation which does not eliminate completely the wax residue. The residue decomposes in contact with the molten metal, forming gases which bubble into the metal.

Other possible causes are trapping of mold atmosphere resulting from low mold permeability and pouring of the metal at too low a temperature.

Remedies are obvious. In the case of burnout, increase the time the mold is heated and increase oxidizing characteristics of the furnace atmosphere. In the case of trapped gas, use of vents from the mold cavity or higher pouring temperatures should be considered.

Slag inclusions may result from a variety of causes. One is rapid roll-over or inversion of the furnace which creates turbulence, mixes slag with the metal, and carries the combined materials into the mold.

Another is that slag in and around the furnace opening from the previous heat is not removed carefully. Possibly the furnace refractories may tend to flux under the operating conditions and form an excess of slag. Keep slag formation at a minimum by using only high quality clean melting stock. Again it may be that dip coat material employed in making the molds is not sufficiently refractory or the pouring temperature of the metal is too high, causing a reaction between coating and metal.

Abrasive Face on Castings

We have been experimenting with the production of abrasive-faced gray iron castings, but are having difficulty in that the silicon carbide or aluminum oxide abrasive stays on the surface instead of penetrating the surface. Also, the abrasive material comes out of the surface when blasted, leaving holes or a rough surface, and no abrasive on the surface. How is the abrasive applied so it will stay below the matrix of the metal and be fused with the metal?

Production of abrasive-faced castings, like many other specialty operations, requires some skill which is gained only with experience. Obtaining a satisfactory abrasive face on castings is a matter of fusion or partial fusion and penetration, and perhaps more fusion than penetration. That, of course, requires hot fluid iron. Also, the iron should be in contact with the facing materials sufficiently long to cause fusion or partial fusion as the case may be, and the facing material should be such as to result in partial fusion.

We suggest you try the following procedure. Spray the mold face with an adhesive coating composed of about 1 part sodium silicate and 6 parts water. Then apply a uniform layer of the abrasive, using a screen of the same mesh as the abrasive. Print or stamp-back the pattern to obtain a smooth or level surface.

After the pattern is removed, the mold face is sprayed again lightly with the sodium silicate solution. Mold face is dried with a torch, al-

lowed to cool and then sprinkled lightly but uniformly with powdered fluorspar. The combination of the silicate and the fluorspar causes partial fusion of the abrasive which adheres to the casting. Gating of the casting should be such that the iron flows all over the face. In some cases it may be advisable to flow the metal across the casting face to an overflow for a short period of time.

Plaster for Making Molds

Located in Japan, we have been readers of FOUNDRY since 1950 and have obtained much useful information as well as being able to follow the progress of the castings industry in the United States. Now we are considering the production of matchplate patterns by the plaster molding process as well as making aluminum impellers as described in the September, 1956, issue of FOUNDRY. However, in Japan the special plaster for aluminum castings is not manufactured, and we would like to know some sources in your country.

Your inquiry is not quite clear on whether you mean that metal casting plaster is not available in Japan, or that a special type is required for aluminum. As to the latter point, the same type of metal casting plaster is used for aluminum as for brass, bronze, etc.

Metal casting plaster differs from ordinary plaster in that it is the alpha or high-strength type, made by heating the crushed gypsum rock under pressure in autoclaves, and then crushing and screening the resulting material.

For use as a mold material the plaster or gypsum is mixed with fibrous talc in the ratio of 4 lb gypsum to 1 lb fibrous talc in the dry state. The plaster or gypsum and fibrous talc may be purchased separately or in prepared form containing talc.

Melting Ore in the Cupola

Please advise us on the feasibility of using a 48-in. ID water-jacketed cupola for the smelting of iron ore. What will be the approximate production for a 24-hour day based on 60 per cent ore? Approximately how long will the furnace be able to run (on a 24-hour day basis) before it would have to be shut down for repairs? Would puddling or continuous tapping be more advisable? Any other information that you think would help us in determining the use of this furnace for said purpose will be welcomed.

Early history of ironmaking in this country indicates that small furnaces similar to the cupola once were employed to reduce iron ore to metallic form, using charcoal as the fuel. Such practice, giving production of only a few tons a day, hardly would be profitable today. Only under certain conditions might it pay to smelt iron ore in that primitive fashion; it is practiced in Red China, as shown in the accompanying illustration.

There is considerable difference between melting down pig iron and scrap and smelting or reducing iron ore to metallic form. The pig iron and scrap can be melted with a ratio of 1 lb coke to 6 to 10 lb of iron while in the reduction of ore the ratio is about 1 lb coke to 2 lb ore. In addition, about 1 lb limestone to 33 lb iron is used in fluxing when iron is being melted, but in iron ore reduction the ratio is 1 lb limestone to about 4.5 lb ore.

The charge or burden of iron placed in the cupola is relatively "open" in structure and the air blast for combustion of the coke can be forced through the layers of coke and iron with low pressures of 16 to 30 oz per sq in. In contrast, iron ore is extremely fine material, making a dense charge which requires blast pressures of 15 to 21 psi to force the air through coke and ore in the modern blast furnace.

Early history also indicates that the iron ores were calcined prior to smelting in the furnace, and the somewhat sketchy descriptions led to the opinion that the operation was similar to sintering, resulting in partial reduction of the iron. Blast pressures undoubtedly were low since the compression was accomplished by bellows and in a few cases by trompes or water blasts.

One might assume from the foregoing that with application of some of the modern developments in cupola operation—such as water cooling, hot blast, and higher pressures—such a unit might be employed to smelt iron ore into metallic form. It is possible but not probable, since it essentially is a matter of economics.

Production of Matchplates

We are interested in obtaining information on the making of cope and drag plates—with irregular partings, of course.

The accompanying sketches with a brief description should give you some idea of the method.

Fig. 1 shows a simple curved pattern positioned on a board equipped with ears for proper lo-

Primitive blast furnaces on outskirts of Hsinyang make pig iron for Red China

cation of the flask. The pattern may be loose, but preferably it should be fastened from the underside of the board to prevent movement after its position is definitely determined. The elevated portion of the pattern is supported as indicated. Supporting material may be sand rammed into place, modeling clay, or plaster. Clay or plaster is preferable.

The supporting material is shaped closely to the desired parting line. When the contouring is completed, a flask is set in position and sand is rammed into place, forming a half mold—in this case, the drag.

Then the mold is rolled over, and the board and material forming the supporting means removed, leaving the pattern in place as shown in Fig. 2. Adjustments are made on the contour of the parting line, if required, and the face of the mold is covered with parting compound.

From this half or drag mold two cope halves are made. They appear as indicated in Fig. 3. One of these is used to produce the drag plate (Fig. 8) and the other for the cope plate (Fig. 9).

In making the cope plate, the pattern is removed from the drag mold (Fig. 2) and a heavy asbestos board template with interior dimensions, contour, and thickness of the desired plate (*A* in Fig. 4) is placed in position on the drag mold. A sprue hole is made in the cope mold, which then is placed on the drag mold. After the assembly is clamped or weighted, it is ready for filling with molten aluminum. The finished drag plate is shown in Fig. 8.

The cope plate (Fig. 9), due to the concave contour, should be boxed unless use of a follow board is contemplated, and either of two procedures may be used as shown in Fig. 5 and 6. The latter is the simpler of the two, using only corner brackets to which separate side pieces later are attached to form the box. In Fig. 5 the boxing is made integral with the plate, and location of ribs if they are required also is indicated.

In either procedure, the extra cope mold (Fig. 3) is the working base. A plate template *A* is placed on the mold as indicated in Fig. 5 and 6. In case of the integral boxing and ribbing (Fig. 5) those elements are situated as indicated, the side pieces being positioned along the inner edges of the template. Where corner bracketing is to be used, the corner elements are placed so that a space equal to the thickness of the side panels or pieces lies between them and the inner edges of the template.

After the various elements are in position on the mold, a flask is set on it and filled with sand which is rammed in place. The mold is removed and set down face upward. The template is lifted off and the various pieces removed carefully. The mold appears as in Fig. 7. Solid lines indicate the cavity for integral boxing and ribbing, and the dotted lines those for brackets. The template is replaced on the mold, which becomes the drag, and the cope set in position. After clamping or weighting, the mold is poured. Final boxed, cope plate appears in Fig. 9.

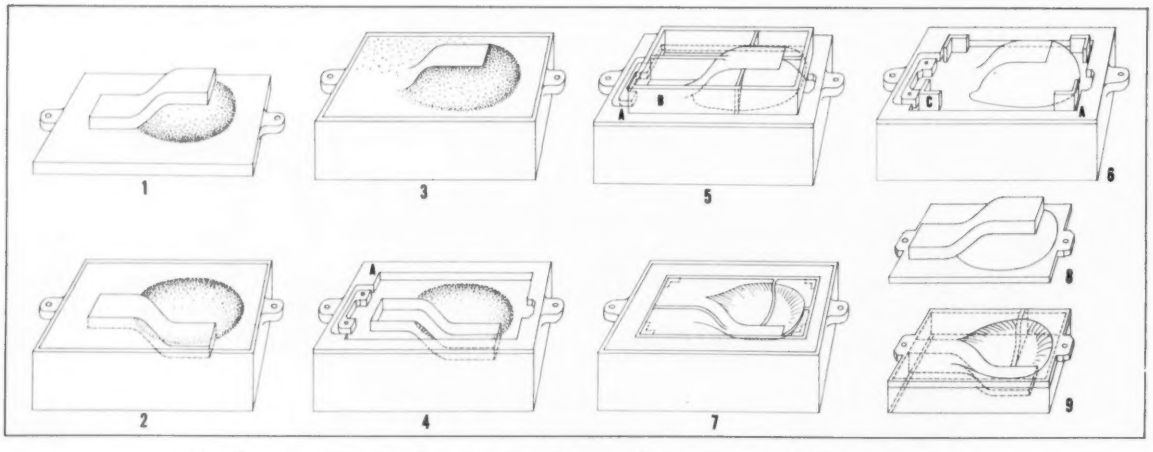
Has Trouble with Rat Tails

In an article in the January issue, reference is made to use of wood flour as an additive to sand. We would like to have information on the use of that material as a possible help in eliminating rat tailing. Also we would like to know if use of wood flour has any ill effect on the sand piles. We operate an aluminum sand casting foundry using No. 1 Albany sand.

As you undoubtedly know, rat tails are attributed to sands which have high hot strength and high expansion characteristics. Remedy is reduction of either or both of those properties. Usually that can be accomplished by addition of materials which have a cushioning effect. Materials in that category include wood flour, cereal, etc.

Amount of material to be added will depend on the severity of the condition. It always is wise to hold the addition to the minimum which will overcome the difficulty since excesses often lead to other problems. In the case of wood flour the amount added is in the range of 1 to 2 per cent, and the same applies to cereal. Sometimes a combination of the two are employed, but the total should not exceed 2 per cent.

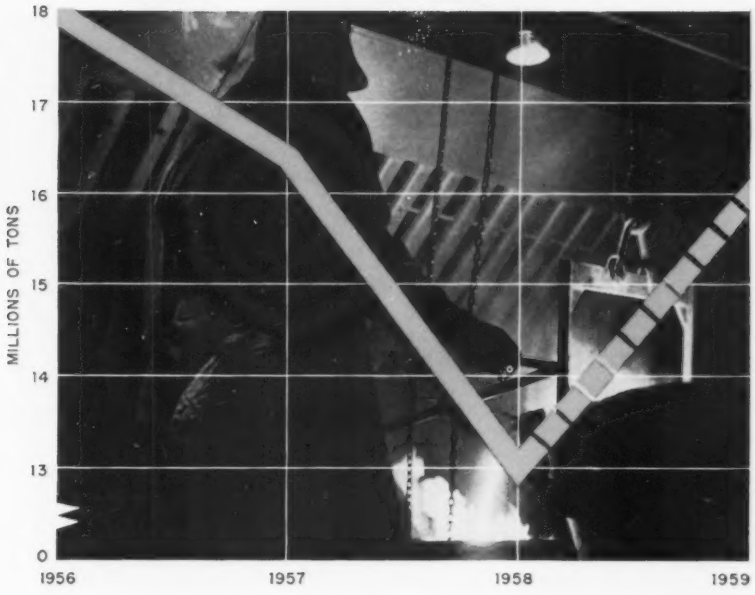
As to the effect of wood flour on the sand, it might be pointed out that wood flour is a fine material and has no bonding power. Hence, an excess of the material in the sand will tend to decrease the permeability, and make the sand weak. Therefore, it is advisable to analyze the sand from time to time to determine the quantity of combustibles.



Sketches showing procedures employed in producing cope and drag matchplates

Foundrymen See Upturn in 1959

Four out of five foundries say they expect better business this year. The average increase looked for, compared with 1958, is 20 to 25 per cent. About one-fourth of all foundries plan major programs of capital expenditures for plants and equipment



Recent and prospective trend in shipments of castings. Increase of 20 to 25 per cent over 1958 is predicted for this year

● EIGHTY per cent of all foundries expect to ship more castings in 1959 than they did last year. Only 2 per cent of them expect a decrease in business, and 18 per cent look for no change.

Foundries predict that the average upturn in shipments this year will be 20 to 25 per cent. If this increase is realized, 1959 shipments will total about 16 million tons of castings. They were 13 million in 1958, 16½ million in 1957, and 18 million in 1956.

The above figures were obtained from a representative cross section of the industry in response to a questionnaire sent by FOUNDRY to 2800 foundries.

Prospects Vary — Some variations will be noted in the accompanying table in expectations of different types of foundries. Malleable foundrymen show the highest percentage —95 per cent of them—looking for an upturn, while the lowest percentage is the 76 per cent of the nonferrous foundries which foresee an upward trend.

The questionnaire also asked foundrymen how they expect the first and second halves of this year to compare. Seasonal influences normally result in heavier shipments of castings during the first six months, but 40 per cent of the responding foundries expect the trend to be reversed this year. Only 8 per cent look for a slower second half, and 52 per cent see the two periods as a standoff in production and shipment of castings.

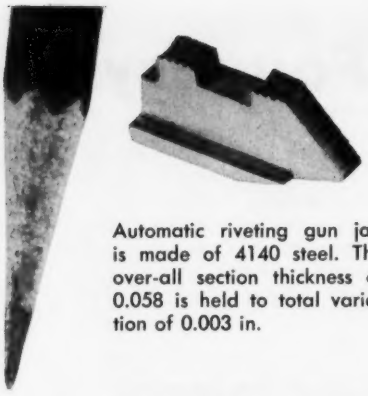
These figures would seem to indicate that the recovery in castings demand will be a gradual and extended one rather than a rapid and concentrated upturn.

Variations also were noted in the predicted amount of business improvement this year. In general, the malleable shops look for the largest recovery—an average of more than

OUTLOOK FOR CASTINGS PRODUCTION IN 1959

	Gray Iron	Malleable Iron	Steel	Nonferrous
Per cent of foundries expecting increased production in 1959	81%	95%	86%	76%
Per cent expecting decrease in 1959	3%	0	0	2%
Per cent expecting no change in 1959	16%	5%	14%	22%
Analysis by Plant Size				
Foundries Employing Over 250				
Expect increase	88%	90%	90%	....
Expect decrease	0	0	0	....
Expect no change	12%	10%	10%	....
Foundries Employing 100-249				
Expect increase	87%	100%	84%	69%
Expect decrease	2%	0	0	0
Expect no change	11%	0	16%	31%
Foundries Employing 50-99				
Expect increase	85%	....	....	75%
Expect decrease	6%	....	....	0
Expect no change	9%	....	....	25%
Foundries Employing 20-49				
Expect increase	80%	....	90%	85%
Expect decrease	0	....	0	3%
Expect no change	20%	....	10%	12%

Clarinet key formerly was made from an assembly of five individual stampings and/or forgings



Automatic riveting gun jaw is made of 4140 steel. The over-all section thickness of 0.058 is held to total variation of 0.003 in.

Casting and Coining Produce

Small, Precision Parts

By J. H. CADIEUX
Vice President
Casting Engineers Inc.
Chicago

● A NEW precision forming process, known as Minicast, combines basic advantages of investment casting with the advantages of such methods as coining or cold forming. Parts up to 1 cu in. in size can be produced in difficult-to-machine metals such as high alloy steels, tool steels, super alloys, and stainless steels, as well as low alloy steels. All commercial nonferrous metals except magnesium alloys and high zinc-copper alloys can be formed by the process. General tolerances on finished parts are ±0.003 in./in.; some dimensions can be held to ±0.001 in./in. Thus, dimensional accuracy is improved by additional processing of investment castings which have general tolerances of ±0.005 in./in. and certain critical tolerances of ±0.003 in./in. The finished parts have a surface finish as fine as 30-50 microinches rms, depending on the type of alloy used.

Parts first are formed as investment castings using plastic patterns. Plastic is more adaptable than wax to high pattern production rates. As many as 20 patterns can be produced simultaneously with one injection shot in a multiple-cavity die. High production methods also are used for making and processing the investment molds and castings. When the precision cast shapes are broken out of the molds and removed from the gating metal, they are coined or cold formed.

Very complex parts can be made. The smallest cross-section produced to date in commercial applications is 0.032 in. thick, but sections as thin as 0.020 in. have been produced experimentally.

To the design engineer, the process provides new freedom to design precision parts which can be produced in large quantities and with economies inherent in the casting and coining processes. Investment casting often incorporates into one part a number of components made individually by other methods, thus eliminating an assembly operation. Subsequent coining or cold forming these cast-to-shape parts produces tolerances and a surface finish of such accuracy that machining may be eliminated in most instances.

When parts previously made by other forming methods are converted to the new process, redesigning normally is unnecesary. Approximately 75 per cent of the parts now being produced by the Minicast process are produced from the same blueprints used when previous forming methods were employed. A majority of the remaining jobs were redesigned to incorporate new features not possible formerly.

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30 per cent compared with 1958—followed by the steel, nonferrous, and gray iron foundries.

Capital Expenditures — Foundries were asked to indicate their plans for capital expenditures this year on plants and equipment. Seventy-two per cent of them said they planned to make some capital improvements. Based on the specified amount and type of equipment or plant facilities to be acquired, FOUNDRY arbitrarily divided these buying intentions into major and minor programs. Approximately one-fourth of the indicated buying plans fall in the major category.

While capital expenditures in certain instances will be made to increase foundry capacity, improved operating efficiency is the aim in most cases.

More foundries—23 per cent of them—said they plan to buy molding machines than any other type of equipment. Nineteen per cent of the foundries expect to purchase sand preparation equipment. The percentages of foundries planning to acquire other major equipment are as follows: Conveyors 16 per cent; melting furnaces 15 per cent; core blowers 14 per cent, and blast cleaning and shakeout equipment each 11 per cent.

CAPITAL SPENDING PLANS

Per Cent of Foundries Planning Capital Expenditures in 1959

	A	B
Gray iron	73%	27%
Malleable	75%	35%
Steel	76%	39%
Nonferrous	60%	18%
Analysis by Plant Size		
No. of Employees		
Over 250	83%	57%
100-249	76%	26%
50-99	69%	26%
20-49	59%	19%
Under 20	48%	15%
TOTAL—all foundries	72%	26%

A—Per cent of foundries with **some** spending plans.
B—Per cent of foundries with **major** spending plans.

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Inset shows actual U. S. Lo-Temp Cup Wheel.

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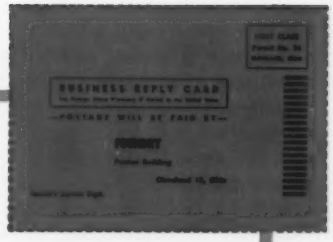


What's New in Equipment and Supplies

CONDUCTIVE COATING

Hysol 6251, a conductive coating based on epoxy resins, is said to possess low-volume resistivity, exceptional toughness, and excellent adhesion. It is easy to handle because working time exceeds four hours.

The compound is recommended

for rebuilding areas worn away by sliding contacts and as a conductive base for plating plastics when reliable bonds of coating to plastic are necessary. Full cure can be effected in 48 hr at room temperature or in as little as 7 minutes at 300° F. Volume resistivity of the coating at 25° C is 0.0008 ohm-cm. —**Houghton Laboratories Inc.**, Olean, N. Y.

For More Details Circle No. 401—Page 53

HIGH-TEMPERATURE MATERIAL

Haynes silicon nitride is designed to operate at temperatures up to and over 3000° F in certain atmospheres. Tubes made of it have been immersed continuously in unalloyed aluminum for 3000 hr without showing any evidence of attack. Crucibles or boats of silicon nitride are being used in the transistor industry for processing and melting germanium, an application where contamination cannot be tolerated. An outstanding application for these parts appears to be in neutral or reducing atmospheres—where low stresses are involved—at temperatures over 3000° F. Parts are available in a large variety of shapes and sizes. They are made by slip casting and can be finished by machining if necessary.—**Haynes Stellite Co.**, a division of Union Carbide Corp., Kokomo, Ind.

For More Details Circle No. 402—Page 53

ROTARY BATCH BLENDER

Small rotary batch blenders for laboratory or pilot plant use feature unit construction with integral motor drive and controls. Models are offered in 5, 10, and 15-cu-ft capacities for materials weighing up to 60 lb per cubic foot. A heavier model is available for materials of greater weight.

The mixer is elevated for charg-

ing with a tilting device, and a disc-type discharge gate seals the unit during the mixing cycle. Optional features include quick-opening doors in the drum and flush ports for cleaning. The blenders are available in mild and stainless steel and also are offered with an internal spray attachment for the introduction of liquid additives during the mixing cycle.—**Munson Mill Machinery Co.**, Seward Ave., Utica, N. Y.

For More Details Circle No. 403—Page 53

ABRASIVE BELT HAND TOOL

Abrasive belt radiuses-finishing hand tool weighs slightly more than 1 lb without small air grinder motor, yet can produce about 4000 sfpm when driven by an air mo-

tor running at 17,000 rpm. It reportedly performs finishing operations on protruding radiuses and convex surfaces in minutes.

The tool has three usable sides —the nose, adjustable for large or small radiuses; the long side, for larger radiuses and convex surfaces; and the top, for flat work. Polishing arm is 16-gage steel, and Oilite bearings are used on the idler shafts. —**Peterson Tool & Mfg. Corp.**, Box 513, Okemos, Mich.

For More Details Circle No. 404—Page 53

GRINDING DISCS

Aluminum oxide grinding discs are claimed to provide up to 25 per cent greater operating safety. Called Spitfires, the solvent and waterproof

discs feature reinforced edges and built-in shape control which is said to eliminate limpness and disintegration due to excessive grit loss.

These discs are available in special, standard, and heavy-duty models in grit sizes 16 through 180. Diameters include 6, 7, 8, and 9⅛ in. with ½ and ⅞-in. arbor holes. —**Abrasive Products Inc.**, Pearl Street, South Braintree 85, Mass.

For More Details Circle No. 405—Page 53

PREWEIGHED FERROALLOYS

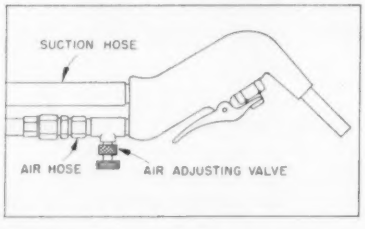
Five crushed ferroalloys now are offered in preweighed bags palletized on crate-type pallets for easier storage and handling. These ferroalloys are available in approximately 50-lb bags with the following weights of contained alloying

elements: 50 per cent ferrosilicon, 25 lb silicon; standard ferromanganese, 40 lb manganese; medium-carbon ferromanganese, 40 lb manganese; silicomanganese, about 30 lb manganese and 8 lb silicon; and calcium-silicon, 50 lb contained material. — **Electro Metallurgical Co., Division of Union Carbide Corp.**, 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 406—Page 53

SPRAY GUN

Pistol-type spray gun for blackening cores and molds, spraying permanent molds, or light sand-



blasting of castings has been redesigned to incorporate an air-adjusting valve when used from air lines without pressure regulation. With suction hose and sinker removed, the sprayer can be used as a blowgun. The unit reportedly sprays silica wash, oil, or water equally well. Made of gray iron with a steel nozzle, the sprayer features a Neoprene, nonleak valve. Flexible hoses are oil and acid resistant. Sizes range from 1/16 to ½ in. Complete unit (with 5-ft suction hose and 20-ft air hose with connections) is available, or components may be purchased separately.—**Jas. A. Murphy & Co.**, 1425 E. High St., Hamilton, Ohio.

For More Details Circle No. 407—Page 53

PRINTED WEIGHT DATA

Printweigh 400 scales print weight data clearly on office forms or tickets up to 8½ x 11 in. even when unit weights are used to increase dial capacity. To supplement the basic weight information, the company offers a choice of optional features to identify printed weights for cost data recording. These include selective numbering, weight identifying symbols, automatic consecutive numbering, and an automatic time and date mechanism.

The unit can be provided with a "memory" to record weights at the scale or transmit digital data after the load has been removed from the platform. Another load can be

placed on the platform without affecting stored data.—**Toledo Scale, Division of Toledo Scale Corp.**, Toledo 13, Ohio.

For More Details Circle No. 408—Page 53

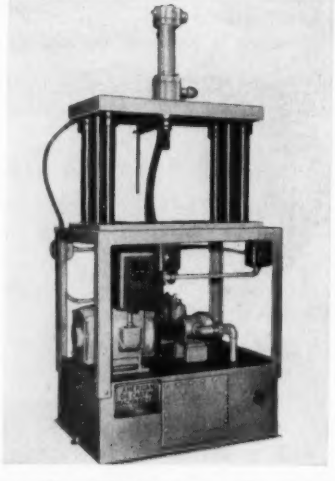
VACUUM FURNACE

Electric bell-type furnace furnishes high vacuums, temperatures to 2700° F, and fast response in heat treat and brazing cycles. Cylindrical metal shields insulate inside walls. Because there is no insulating brick, a high vacuum can be obtained quickly and maintained easily. Quick heat-up and cooling cycles are characteristic of the unit, which is used chiefly for heat treating super alloys of stainless steel and refractory metals such as titanium and zirconium. The casing is water-jacketed to keep it cool, and losses due to convection are reduced by the vacuum in the furnace. Protective gas atmosphere can be used. The heat-resistant

Trim Press Designed for Diecasting Work

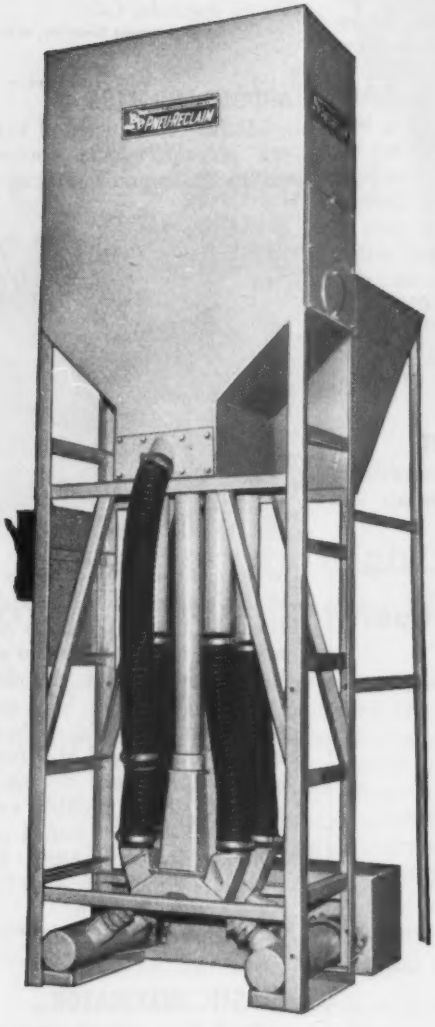
High-speed, low-cost hydraulic trimming press is especially designed for the diecasting industry. Features include a self-contained hydraulic system that requires no additional floor space. The entire platen area can be utilized, and the four-post die set offers rigidity and uniformity in flash-trimming operations.

Adjustable die height can be maintained by setting the screw rod and nuts. The hydraulic system has a cleanout hole, double pushbuttons are provided for safe operation, and the solenoid controls are electrically operated. Every part of the unit can be reached for easy adjustment and maintenance. Platen sizes are 14 x 30 in. and larger. —**American Die Casting Machinery Co.**, 1744 Winona St., Chicago 40, Ill.



For More Details Circle No. 427—Page 53

IS YOUR FOUNDRY DUMPING OVER IN RECLAIMABLE SAND THIS YEAR?



EVEN SMALLER FOUNDRIES DO...

Large expenditures for new sand aren't limited to the larger foundries. Many foundrymen are surprised and even shocked when they calculate the cost of new sand in their foundry operations. One typical medium-size foundry revealed these figures:

Cost of new sand per ton at siding	$5.83
Cost of moving sand to storage, per ton	.65
Cost of storage, per ton	.25
Cost of trucking used sand to dump, per ton	.55
Total cost, per ton	$7.28
Total cost per month (based on 150 tons/month)	$1,092.00

Of course, bigger foundries spend more . . . much more. Yet, the sand hauled to the dump is perfectly reclaimable for use as new sand. The sand dumped represents dollars lost forever . . . dollars that a reclamation unit could save.

NOW—RECLAMATION COSTS LESS

The newest of dry reclamation units—Pneu-Reclaim—actually costs less to install and use than earlier units. Its many exclusive features—dual-jet scrubbing, high recovery fines control, level-flow and simple quantity-quality control—mean lower-cost operation and superior peformance. The typical costs shown below are based on hundreds of actual tests:

Typical cost of reclaiming for reuse in molding sand mixtures, per ton	30c
Typical cost of reclaiming for reuse in core sand mixtures, per ton	90c
Typical cost of reclaiming for reuse in CO_2 sand mixtures, per ton	60c

These costs include all of the charges for power, maintenance and operation. Because Pneu-Reclaim *requires half the air pressure for operation, it consumes half the power required by earlier units.*

AND SAVES MORE!

It's easy to find how much Pneu-Reclaim can save your foundry. Simply compute the actual cost of each ton of sand delivered to your foundry, used in your system and then discarded, and subtract the cost of reclamation. The difference represents the saving offered by Pneu-Reclaim per ton of sand reclaimed and used in lieu of new sand.

TYPICAL EXAMPLE

Cost per ton of sand delivered, used and discarded	$7.28
Cost per ton of sand reclaimed for reuse in molding sand mixtures	.30
Saving per ton	$6.98
Saving per month (based on 150 tons/month)	$1,047.00

A no-obligation demonstration will prove these facts for you. Write today!

B&P PNEU-RECLAIM

Beardsley & Piper
Div. Pettibone Mulliken Corp.
2424 N. Cicero Ave. • Chicago 39, Illinois

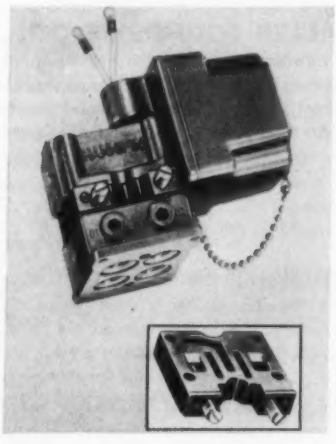
Circle 608 on Page 53

metal shields form a complete enclosure around material being heat treated and retard heat losses due to radiation.—**General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 409—Page 53

SPEED CONTROL VALVE

Speed control valve can be installed as an integral part of any of the company's Series CC direc-



tional air control valves. It is capable of accurate control of cylinder piston speeds by independently metering exhaust flow from both ends of an air cylinder through a single exhaust port in the valve. Supply flow is unaffected by the metering device, and adjusting screws have extra-fine threads and metering tapers to give a wide controllable range without extreme sensitivity.

The speed control section is 5/8 in. thick and is constructed of corrosion-resistant materials. Installation is reported to be fast and simple. The section can be factory installed on new Series CC valves or ordered in kit form for installation on such valves already in service.—**Hannifin Co.**, Dept. 238, Des Plaines, Ill.

For More Details Circle No. 410—Page 53

PNEUMATIC GRINDERS

Portable pneumatic grinders have been added to the company's line of tube maintenance tools. The expanded line includes both horizontal and high-speed die grinders.

Horizontal grinders are applicable to operations such as grinding, buffing, and wire-wheel work. They are designed for ease of handling and reduced operator fatigue. The die grinders are for operations such as filing, grinding, cutting, and polishing. They are available in two sizes with rated speeds of 40,000 or 60,000 rpm.—**Thomas C. Wilson Inc.**, Long Island City, N. Y.

For More Details Circle No. 411—Page 53

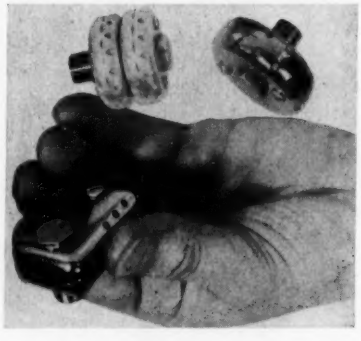
DIECASTING LUBRICANT

Plunger Lube Lite is reported to have reduced costs of repair and downtime on metal injection cylinders, plunger tips, and sleeves of diecasting machines as much as 40 per cent. It is a viscous, adhesive material, but will flow at room temperatures. Composition includes a percentage of suspended microfine metallic combinations to resist wear, and the lubricant is claimed to remain adhesive without thinning out when applied to the hot tip. It remains wet and does not allow the flow of fluid to bypass into casting runners or castings. Higher pressures for pumps for automatic systems are not necessary.—**Die Casting I. D. Corp.**, 631 Bungalow St., El Segundo, Calif.

For More Details Circle No. 412—Page 53

MIDGET MUFFLERS

Mufflers constructed of long-lasting polyether foam enclosed in anodized aluminum are claimed to



be excellent silencers of noises caused by exhausting air. Model M-1 (held in hand) protrudes only 3/4 in. when mounted flush to a 1/8 or 1/4-in. exhaust port. Model M-2 (top right) is 1 in. long and also will accommodate 1/8 or 1/4-in. exhaust ports. Model M-3 (top left) is 1 3/4 in. long and fits into a 3/8-in. port. These mufflers are rustproof and can be cleaned in most common solvents.—**Mead Specialties Co.**, Dept. MM-8, 4114 N. Knox Ave., Chicago 41, Ill.

For More Details Circle No. 413—Page 53

PLASTIC RESPIRATOR

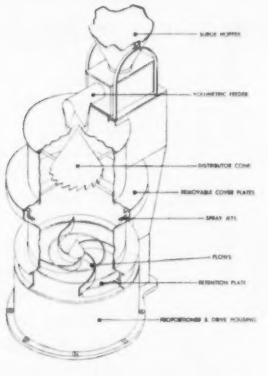
Air-Raider plastic respirator is said to protect wearer from dusts, pneumoconiosis - producting mists, and chromic acid mists. It weighs 2 1/2 oz, yet is claimed to provide greater functioning filter area, which increases filter life. Location and construction of the valve reduce inhalation and exhalation resistance.

Blender Has Many Metalworking Applications

Continuous-flow blender, the Verticone, is said to proportion, mix, blend, and discharge a wide range of dry materials accurately or to blend liquids with solids in precise quantities.

This versatile unit can be used for a variety of metalworking applications including tempering foundry sand and adding liquids to dry-mix materials. The blender also can be used to suppress dust created by loading or discharging coke or similar bulk materials from bins and silos.

When only solids are blended, effective dust control can be provided by conditioning with a surface-active compound developed by the company. Controlled wetting is achieved in the unit with as little as a fraction of 1 per



cent of moisture, or it can be adjusted precisely and metered to add any specific volume of moisture desired. — **Johnson-March Corp.**, 1724 Chestnut St., Philadelphia 3, Pa.

For More Details Circle No. 428—Page 53

Don't Buy FLUX...BLINDFOLDED

BUY *Famous* CORNELL CUPOLA FLUX

for Gray Iron and Malleable Foundries

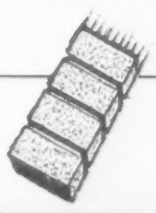
. . . known for its High Quality and Purity by Foundrymen Everywhere!!

No matter what handling methods you use—what mold materials you employ, the quality of your molten iron is all-important! That's why foundries "in-the-know" depend on Famous Cornell Cupola Flux to help purify their metal—to improve the quality of their castings. Famous Cornell Cupola Flux is the one scientifically designed product that greatly increases slag flow off and guarantees complete cleansing of coke (giving carbon constant). Write for a Cornell representative to call. Write for Bulletin 46-B.

"often imitated but never equalled"

DAWSON-MacDONALD CO., 141 Pearl Street, Boston 10, Mass.
Now Representing The Cleveland Flux Company in New England

No Gamble when you use Famous CORNELL Aluminum, Copper or Brass Flux



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FAMOUS CORNELL FLUXES

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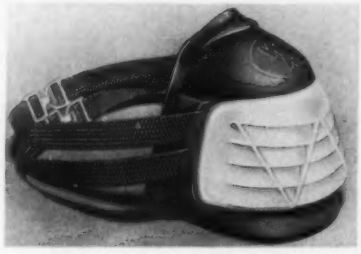
Circle 609 on Page 53



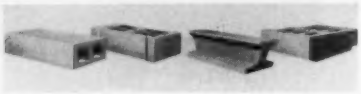
The respirator is made of a nontoxic, durable, modified polyethylene material, and the filter is a treated wool electrostatic type. — **Welsh Mfg. Co.**, 15 Magnolia St., Providence 9, R. I.

For More Details Circle No. 414—Page 53

KILN CAR AND FLOOR BLOCK

Additions to the company's line of refractory products include kiln car and floor block in a wide range of mixes, including two formulas designed to combat failures caused by excessive thermal shock. They are said to offer extraordinary resistance to sudden heating and cooling and to vary only in maximum temperature range.

Shown, left to right, are Type O kiln car top, open-end block for use in flat-deck kilns; Type U kiln car top, perforated block for use in raised deck kilns; I-beam block for use with raised deck kilns; and J-288



floor block, for periodic kilns.— **Robinson Clay Product Co.**, 65 W. State St., Akron 9, Ohio.

For More Details Circle No. 415—Page 53

THERMOCOUPLE WIRE

Line of Serv-Rite premium sheathed thermocouple wire with ceramic alloy insulation is available in several ISA calibrations and in outside diameters from 0.020 to ½ in. It offers a wide choice in sheath material as well as magnesium, aluminum, or zirconium oxide hardpack insulation. Various standard junction tips, fittings, and connectors also are available. Standard and special thermocouple assemblies also are made to suit any application requiring this wire.— **Claud S. Gordon Co.**, 3000 S. Wallace St., Chicago 16, Ill.

For More Details Circle No. 416—Page 53

LIFT TRUCK

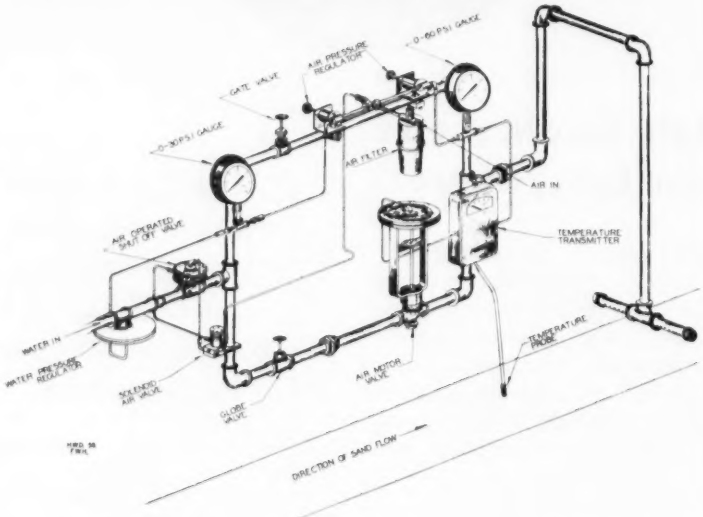
Lift truck of 2000-lb capacity is powered by a 4-cylinder, 133-cu-in. engine which delivers 35 bhp at 2400 rpm. Gasoline or LP fuel models are available. Standard transmission is a two-speed, con-

stant-mesh type, and torque converter drive is optional.

Heavy-duty frame is said to assure complete alignment of parts for long life and low maintenance costs and to provide low-level weight mass. An "extra-lift" mast gives maximum stacking height of 131¼ in., over-all lowered height of 83 in., and 16¼ in. of free lift. Over-all width of the truck is 32 in., and the outside turning radius is 62 in. Attachments include clamps, side shifters, load backrests, and overhead guards.—**Allis-Chalmers Mfg. Co.**, Engine-Material Handling Div., Milwaukee, Wis.

For More Details Circle No. 417—Page 53

Cooler Reduces Shakeout Sand Temperature



No. 3903 automatic sand cooler is said to reduce temperature of sand rapidly as sand is in transit from shakeout to sand storage bin.

An installation requires 4 to 6 ft of belt space with 2 ft of overhead room.

The unit employs the principle of adding water to hot shakeout sand at a controlled rate based on temperature and volume of the sand. Water is added only to reduce sand temperature effectively, yet permit it to feed through bucket elevators and screens.—**Harry W. Dietert Co.**, 9339 Roselawn Ave., Detroit 4, Mich.

For More Details Circle No. 429—Page 53

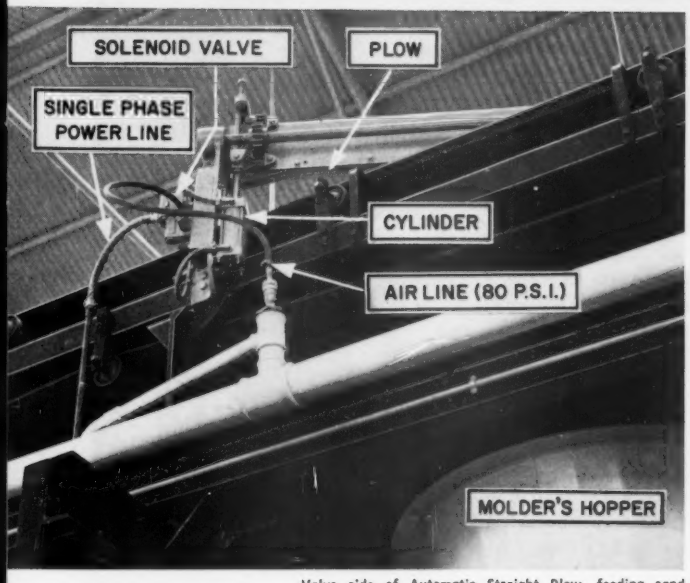
DIFFERENTIAL HOISTS

Budgit differential-type chain hoists are offered in ¼, ½, and 1-ton capacities. Of simple design, they are produced primarily for use when efficiency is secondary to price. Several design features make them ideal for outdoor use or where portability and headroom are prime considerations.

Both upper and lower yokes are made of shock-resistant, lightweight aluminum alloy. Frictional drag is

Circle 610 on Page 53→

AUTOMATIC PLOWS



Valve side of Automatic Straight Plow, feeding sand from distribution belt into one of eight molder's hoppers on continuous casting plant.

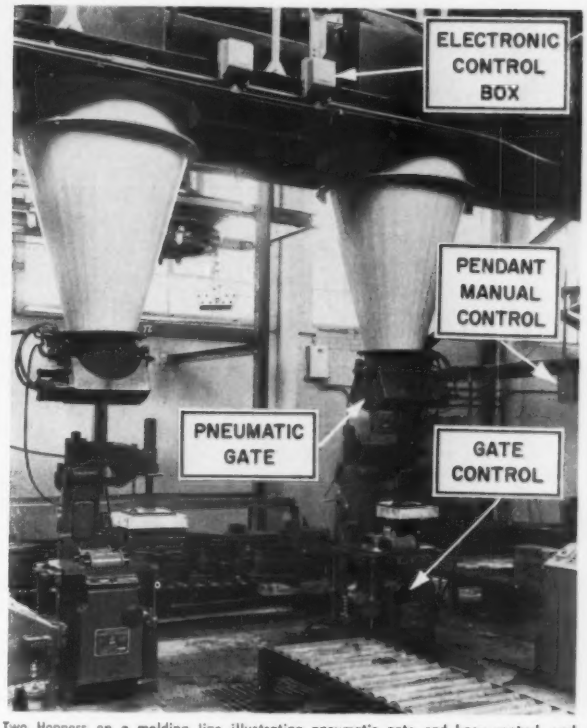
Proved Electronic Hopper Level Indicator and Automatic Plow System cuts labor, reduces effort, improves production and is further step toward foundry automation. If you operate an overhead distribution belt conveyor in your sand system. This MUST interest you!

- ★ Plows may be straight or vee, for any standard belt between 16" and 36" wide, and can be fitted in new or existing installations-replace your hand plows with automatics!
- ★ Economy—no man on platform; therefore saving wages and overheads, ensuring rapid pay-off. Sensitivity of operation reduces throughput of sand for given mold output.
- ★ All molders, all the time, are assured of sand supply—from two, to any number of machines in the line.
- ★ No sand spillage over top of hoppers and no loss of production thru sand shortage.
- ★ Fully automatic, interlocked, fool proof electrical system.
- ★ All plows fitted high precision single solenoid pneumatic valves, interchangeable with front line U.S. made valves, proved thru millions of operations.
- ★ Complete flexibility—any one, some or all plows can also be push button operated from pendant control adjacent to molder's working position.
- ★ Pendant control incorporates indicator light signals, so each molder knows what is happening above.
- ★ Used with our pneumatic gates, provides most modern method of sand supply to molding machine line.
- ★ Can also be used in larger molder's hoppers with feeder belt discharge.

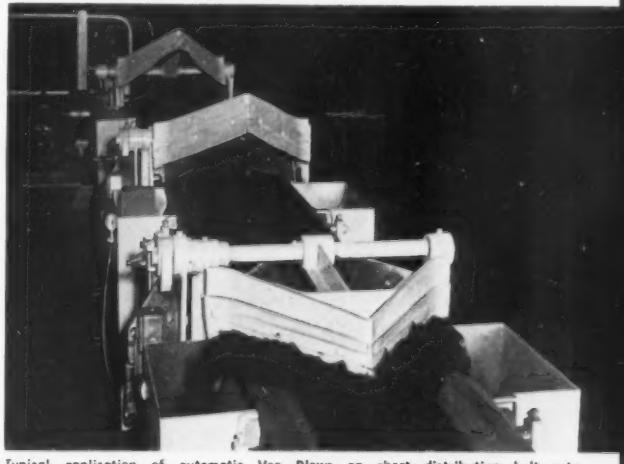
Patents pending in U.S.A., Canada, Great Britain and other Industrial Countries.

WRITE TODAY FOR BULLETIN 153/NA

INSURE SAND SUPPLY WITH LABOR ECONOMY



Two Hoppers on a molding line illustrating pneumatic gate and knee control, and showing position of pendant control for automatic plow. This incorporates indicator lights and push button for independent manual control.



Typical application of automatic Vee Plows on short distribution belt—note compact valve and operating mechanism on left.

FE FOR FOUNDRY EFFICIENCY

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reduced to a minimum. All holes in yokes are machined accurately in one operation to assure perfect alignment of both hook and load sheave pins. Deep pocket sheaves provide positive chain travel and eliminate binding or gagging of the chain. — **Manning, Maxwell, & Moore Inc., Shaw-Box Crane & Hoist Div.**, Muskegon, Mich.

For More Details Circle No. 418—Page 53

ULTRASONIC INSPECTION UNIT

The Model UR-600 Reflectoscope is said to offer great sensitivity for locating surface and internal defects, ascertaining differences in

structure and physical properties, and measuring thickness. It incorporates advanced pulser and receiver circuitry which assures great sensitivity and high resolution at no sacrifice of linear response or dynamic range.

A variable pulse repetition rate facilitates high-speed scanning of small parts. Brighter video trace on the edge-lighted CRT screen makes for easier reading in daylight with faster interpretation of indications. The instrument can be used for both contact and immersing testing with one or two search unit techniques. It weighs 75 lb and is self-contained in an aluminum case.—**Sperry Products Inc.**, Shelter Rock Road, Danbury, Conn.

For More Details Circle No. 419—Page 53

V-BELT DRIVES

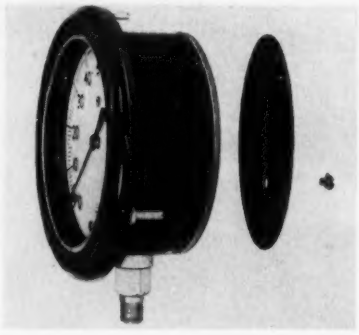
New line of V-belt drives is said to feature smaller, lighter sheaves and higher-capacity V-belts at lower cost. Introduced under the tradename Dyna-V, the drives cover the full range of horsepower capacities ordinarily available. It is claimed that with this line, the majority of industrial drives can be handled with belts only $\frac{3}{8}$ in. wide. Sheaves are said to be reduced in both width and outside diameter.

These drives are offered in two standard groove sizes—the 3V, nominal $\frac{3}{8}$-in. top width, and the 5V, 5/7-in., sizes. The latter is for higher horsepowers. An 8V series is for even higher horsepower requirements. All feature Taper-Lock bushings for quick and secure mounting on shafts.—**Dodge Mfg. Corp.**, Mishawaka, Ind.

For More Details Circle No. 420—Page 53

PRESSURE GAGE

Pressure gage with a solid, integrally cast metal frontplate is said to afford workers better protection from Bourdon tube rupture due to overpressure, corrosion, or other



factors. The plate forms a partition between the dial and the tube and is designed to divert the force of a burst backward.

The gage is equipped with the company's standard corrosion-resistant movement—a cam and roller design with no teeth. It is available in $4\frac{1}{2}$ and 6-in. dial sizes to measure pressures up to 20,000 lb to guaranteed accuracy of $\pm\frac{1}{2}$ of 1 per cent of full-scale range. Bourdon tubes in phosphor bronze, alloy steel, stainless steel, and K Monel are available. — **Helicoid Gage Div., American Chain & Cable Co.**, Bridgeport 2, Conn.

For More Details Circle No. 421—Page 53

CYLINDER COMBINATIONS

Company says that it can make off-the-shelf delivery of more than 1 million different popular combinations of its line of Series A standard-duty air and hydraulic cylinders.

The components for 21 mounting styles are stocked, and cylinders can be assembled, tested, and shipped within 48 hours after receipt of exact specifications. Many popular sizes and types are ready for immediate shipment. The cylinders are for applications up to 200 psi air and 500 psi oil or water. They incorporate rustproofed ferrous parts, hard-chrome plated piston rods, and micro-honed brass barrels. Large cross-sectional area of

Mixer Is Designed for CO_2 Process Sand

Low-cost, 100-lb capacity mixer is designed especially to prepare sand for CO_2-hardened cores.

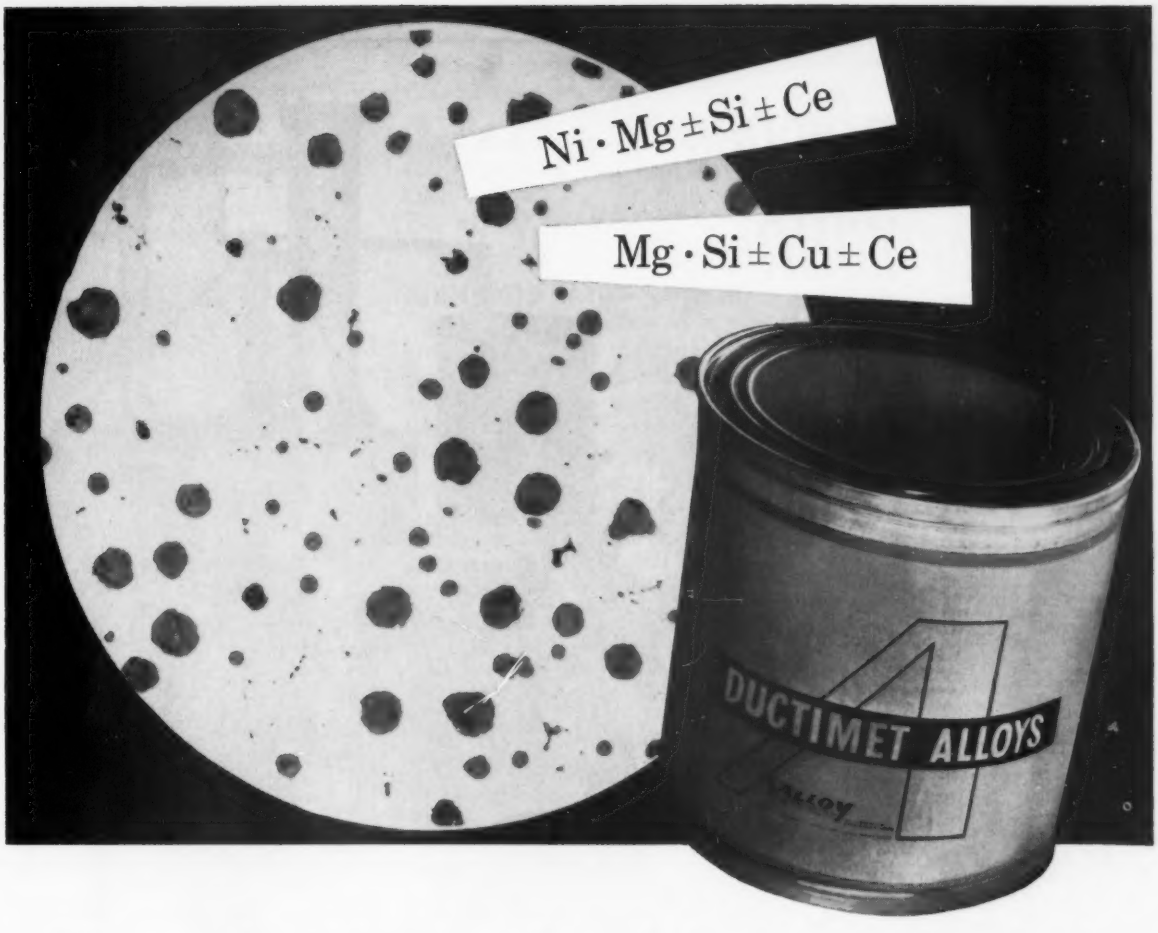
Machine is a self-contained unit equipped with a 1-hp electric motor and can mix a 100-lb batch of sand in 3 minutes. The unit also is available without power.

The portable hopper is situated on the mixer frame at a convenient height to facilitate carrying it from the mixer to the coreblower. Covers are provided on both the mixing drum and the hopper to keep mixed sand moist for many hours.

The mixer is said to be virtually self-cleaning. Drum and paddles can be cleaned in just a few seconds, according to the

manufacturer. The unit is 36 in. long, 40 in. wide, and $47\frac{1}{2}$ in. high. Shipping weight is 200 lb.—**Gilson Mfg. Co.**, Oostburg, Wis.

For More Details Circle No. 430—Page 53



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Circle 611 on Page 53

New Protection For YOUR Equipment— At Temperatures Up To 3300°F

ALUNDUM castables offer unusual advantages to all industries using high temperature installations*

Will fire continuously up to 3300°F. This Harrop gas-fired furnace, recently developed by the Electric Furnace Division of the Harrop Ceramic Service Company, Columbus, Ohio, is particularly applicable to the firing of ceramic oxide bodies. Norton ALUNDUM 33-I Insulating Castable selected for the inner lining of the furnace and its roof, provided completely satisfactory protection under repeated tests at highest operating temperatures.

The new Norton ALUNDUM Castables are made in two types: 33-I Insulating and 33-HD Heavy Duty. At temperatures up to 3300°F both types have been extremely successful in protecting high temperature processing — in many industries and many different installations.

ALUNDUM 33-I Insulating Castable is made up primarily of pure aluminum oxide bubbles, tiny and countless. Forming a network of air spaces, it assures excellent insulation, even at highest commercial temperatures.

ALUNDUM 33-HD Heavy Duty Castable is chiefly composed of dense grains of pure aluminum oxide. It is recommended for forming dense monolithic surfaces in many types of furnaces where high temperature conditions are particularly severe.

Both 33-I and 33-HD Castables are very easy to store, mix and use. With them you can cast simple or complex shapes quickly and economically, replace more expensive pre-fired shapes, and cut maintenance and replacement costs to very lowest. Ask your Norton Representative for details, and for the folder *Two Norton Castables.* Or write to NORTON COMPANY, Refractories Division, 301 New Bond Street, Worcester 6, Massachusetts.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

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NORTON PRODUCTS Abrasives • Grinding Wheels • Grinding Machines • Refractories • Electrochemicals — **BEHR-MANNING DIVISION** Coated Abrasives • Sharpening Stones • Pressure-Sensitive Tapes

the ports assures fast operating response.—**S-P Mfg. Corp.**, 30201 Aurora Rd., Solon, Ohio.

For More Details Circle No. 422—Page 53

PYROMETER CONTROLLER

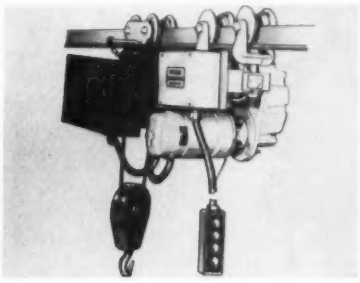
The Alnor Pyrotroller is an indicating-controlling pyrometer which can be applied wherever a thermo-

couple can be used to measure temperature. It is said to offer high dependability because a minimum of components is involved in the design. This feature also results in small space requirements. The flush mounting case style is shown here, but other styles are available. In addition, this on-off control is available in either single or double target versions. The unit can be placed in the smallest conduit housing.—**Illinois Testing Laboratories Inc.**, 420 N. LaSalle St., Chicago 10, Ill.

For More Details Circle No. 423—Page 53

MONORAIL DRIVE UNIT

Electric-powered monorail drive unit, the UnitReactor, is designed to move hoists or other load car-



riers along a monorail system or across bridges. It will handle live loads up to 5 tons at travel speeds to 2000 fpm and will operate on any type of monorail system which has a clear undersurface.

Traction is obtained through a spring-loaded, solid rubber drive wheel which runs on the underside of the track. Power is transmitted to the wheel through a spur gear reduction unit. Full magnetic-type electrical controls are provided. Current collectors can be used, or current can be supplied from the hoist.—**Becker Crane & Conveyor Co.**, 4900 Ridge Rd., Cleveland 9, Ohio.

For More Details Circle No. 424—Page 53

ALUMINIZED RAYON CLOTHING

Aluminized, flameproofed rayon protective clothing is designed to provide strength, high resistance to radiant heat, and stability under flexing.

Garments in the line include coats, aprons and sleeves, pants, leggings, hats, hoods, bibs, spats, shoe covers, overshoes, blankets, cuffs, gloves, caps, and helmets. They

are said to be soft, pliable, and comfortable to wear for extended periods.—**Wheeler Protective Apparel Inc.**, 224 W. Huron St., Chicago 10, Ill.

For More Details Circle No. 425—Page 53

MERCURY LAMPS

Bonus Line 400-w mercury lamps are claimed to produce 28 per cent more light over their lifespans than present mercury lamps of same size and wattage. They are said to give 25 per cent more light after 4000 hours of burning time and 65 per cent more after 8000 hours. Rated useful life is more than 9000 hours. An improved resistor is reported to afford greater protection against failure during hot restarts and from high voltage surges.—**General Electric Co., Large Lamp Dept.**, Nela Park, Cleveland 12, Ohio.

For More Details Circle No. 426—Page 53

Birmingham To Be Host to Southeastern Conference

Birmingham District Chapter, the Tennessee Chapter, and the University of Alabama Student Chapter of the American Foundrymen's Society will sponsor the 27th annual Southeastern Regional Foundry Conference on Feb. 26-27. The meeting will be held at the Tutwiler Hotel, Birmingham.

Program details follow:

Thursday, Feb. 26

9 a.m.—Registration.
10 a.m.—**How To Get the Most Out of Your AFS and the Regional Conference,** William W. Maloney, general manager, AFS.
12:30 p.m.—Luncheon.
2 p.m.—**Noise in the Foundry,** Floyd E. Frazier, National Association of Mutual Casualty Companies.
3 p.m.—**Gating and Risering of Castings,** Prof. Clyde M. Adams, Massachusetts Institute of Technology.

Friday, Feb. 27

9 a.m.—Plant visitations.
1:30 p.m.—**Direct Reduction Processes for Cast Iron,** H. W. Lownie Jr., Battelle Memorial Institute; **Gating and Risering of Brass and Aluminum,** R. A. Colton, Federated Metals Div., American Smelting & Refining Co.
2:30 p.m.—**The Buhrer Automated Molding and Pouring Method,** Alex H. Homberger, International Automation Corp.
3:30 p.m.—**Cold Setting Binders,** Daniel R. Chester, Archer-Daniels-Midland Co.; **Causes and Correction of Nonferrous Casting Defects,** Ray Cochran, R. Lavin & Sons Inc.
7 p.m.—Annual banquet: Lewis H. Durdin, president, AFS, speaker, and Warren Whitney, James B. Clow Co., toastmaster.

Foundry Flux in Brazil

Beta Industrial E. Commercial Ltda, Sao Paulo, Brazil, subsidiary of Pittsburgh Metals Purifying Co., is now producing the complete line of Soffel's foundry fluxes, purifiers, and exothermic compounds under the latter's patents. Its new plant recently was put into operation under the direction of Dr. Paul F. Webster, research director, Treesdale Laboratories & Textile Processing Co., Mars, Pa., of which Pittsburgh Metals is a division.

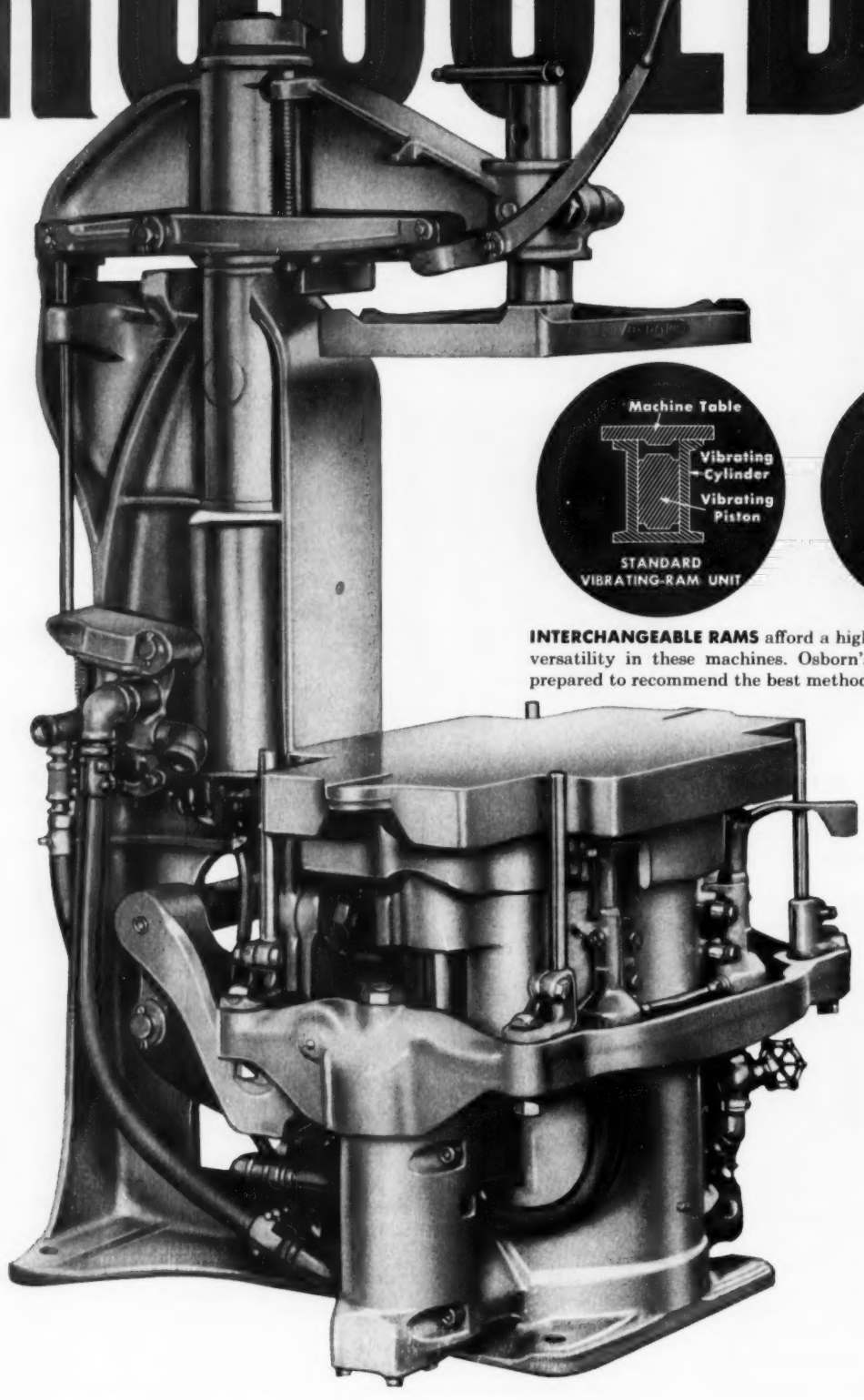
FOUNDRY Index Is Ready

Index to FOUNDRY, Volume 86, listing by title, subject matter, and author the editorial material published during 1958, is ready.

Readers find the index a handy reference to various phases of foundry practice, new techniques, and recent developments in the industry and a quick means of locating information published during the year.

Copies may be obtained without charge by directing requests to FOUNDRY, Penton Building, Cleveland 13, Ohio.

RUGGED...



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Vibrating Squeeze Stripper and Jolt Squeeze Stripper machines . . . engineered for dependable, precision molding performance by OSBORN

Designed and built around a single basic, dependable machine—today's complete line of Osborn Vibrating Squeeze Strippers and Jolt Squeeze Strippers gives the foundryman a choice of ruggedly-built units with the flexibility to handle a wide range of molding requirements.

In addition to the optional features shown below and the choice of vibrating-ram or jolt-ram actions—there are other important advantages in the line:

- Oil-controlled pattern draw with automatic acceleration from slow to fast . . . and automatic cushioning. Draw stroke is adjustable for any length of travel up to maximum—and for speed of slow draw. Pattern vibrator control can be set for required vibrating intervals—automatic synchro with the draw mechanism.
- Lifting pins adjustable for an extensive range of flask shapes and sizes . . . carried on cast draw frame. Equipment design demands that all draw mechanism parts function with uniform accuracy.
- Machines are available with squeeze cylinder diameters of 12″, 14″, 16″, 19″ and 21″ sizes.

In foundries throughout the country today—both types of all Osborn Squeeze Stripper models are on the job . . . producing at lower cost, higher-profit.

For full details on your applications—call in your Osborn Foundry Specialist to discuss your plans and problems soon. Write *The Osborn Manufacturing Company, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

WRITE FOR YOUR COPY . . . Folder No. 71-A gives complete specifications, operating data, applications and design features on the Osborn line of Vibrating Squeeze Stripper and Jolt Squeeze Stripper machines.

THESE OPTIONAL FEATURES FOR ALL MODELS . . . GIVE ADDED FLEXIBILITY

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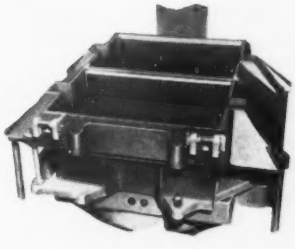

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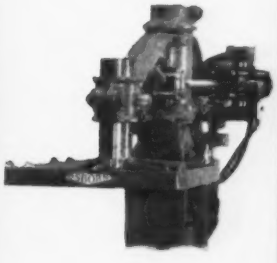
Single Push-Button Automatic Control Panel



Power-Operated Squeeze Head

leader in mechanization for the foundry

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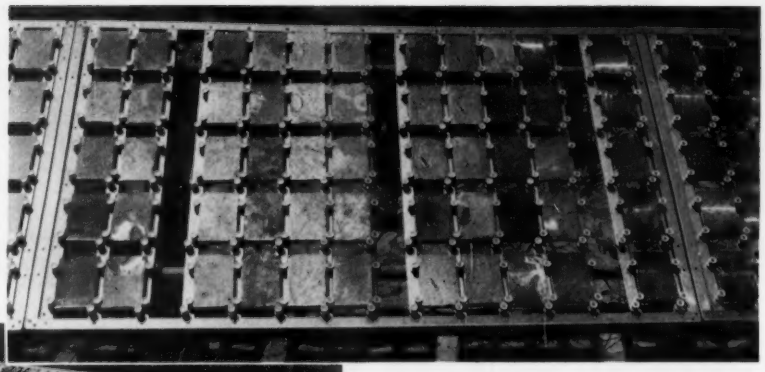
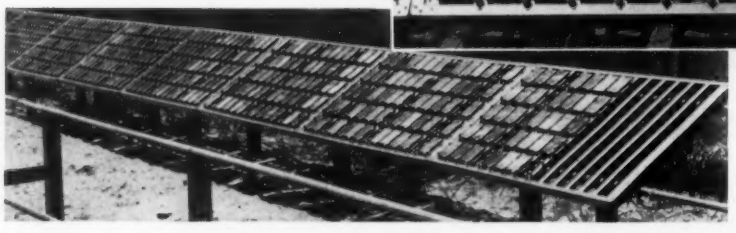
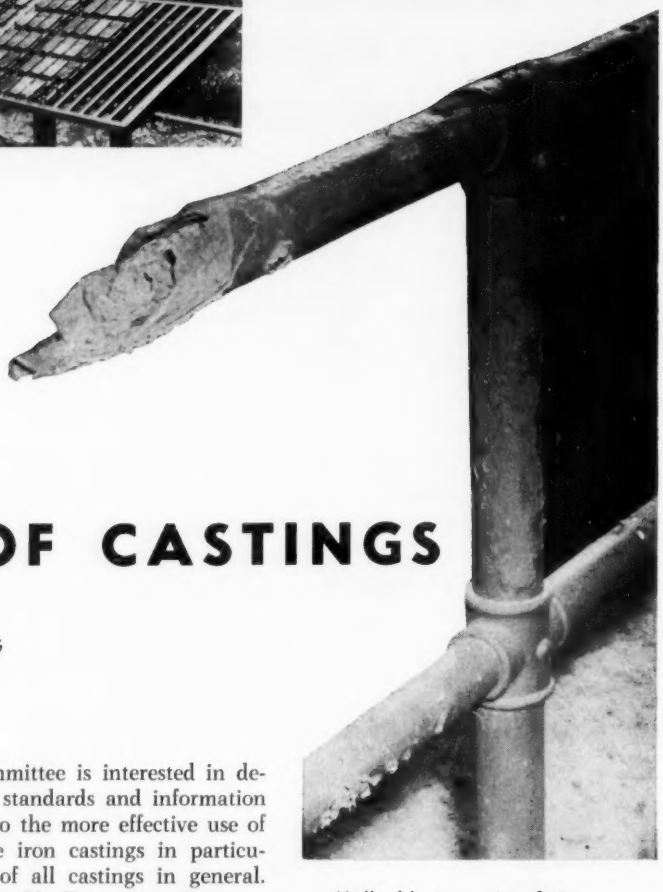
Circle 613 on Page 53



Arrangement for mounting test plates in study of resistance to atmospheric corrosion. The plates will remain for periods of 1, 3, 7, and 12 years





Malleable iron pipe fittings remain serviceable long after railings are badly corroded

Obtains the Facts on

CORROSION OF CASTINGS

By JAMES H. LANSING
Castings Consultant
Cleveland

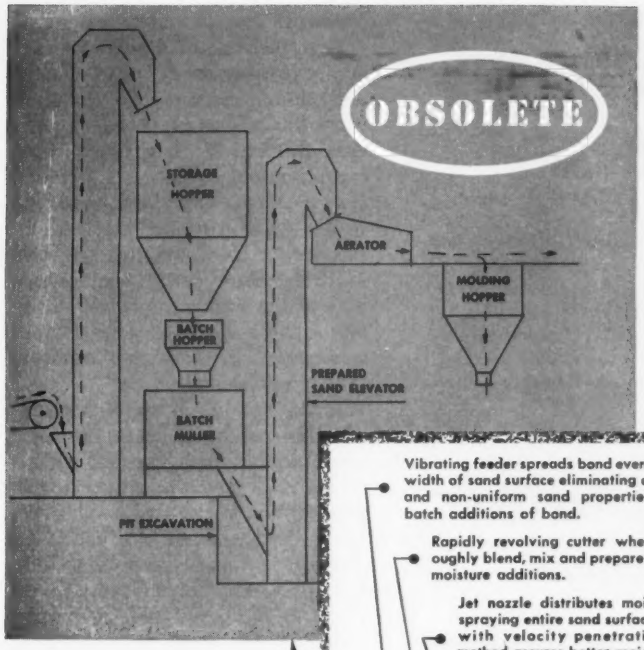
• CORROSION is important to all producers and users of materials and the products of which they are a part. It has been estimated that the annual loss due to corrosion is more than $6 billion. Among the organizations studying the subject of corrosion resistance of materials is the American Society for Testing Materials.

The ASTM is engaged in the development and promotion of knowledge of the materials of engineering and the standardization of specifications and methods of testing. Its committees include the Advisory Committee on Corrosion, which advises other committees which may undertake corrosion test work. Also among its committees is Committee A-7 on Malleable Iron Castings. This committee is interested in developing standards and information leading to the more effective use of malleable iron castings in particular and of all castings in general.

Castings No Exception—Castings, like other forms of metal, may be subject to corrosion. The degree of corrosion is less if heat treatment, which precludes the retention of casting strains, is a part of the method of manufacture. This condition is true in the case of malleable iron and those steel and nodular iron castings which are heat treated. Castings, of course, are free from the forming strains which parts produced by other methods may possess.

Malleable iron castings have long been known to have good resistance to atmospheric corrosion. For example, the accompanying illustration shows malleable guard rail fittings which have retained their form and function while parts of the pipe railing have disintegrated.

Other examples of service in which malleable castings have long withstood atmospheric corrosion include various farm implement parts and freight car brake wheels, brake



WHY BUY OBSOLETE MULLERS

The PEKAY Mixer Muller . . .

- Increases sand capacity and quality at minimum cost
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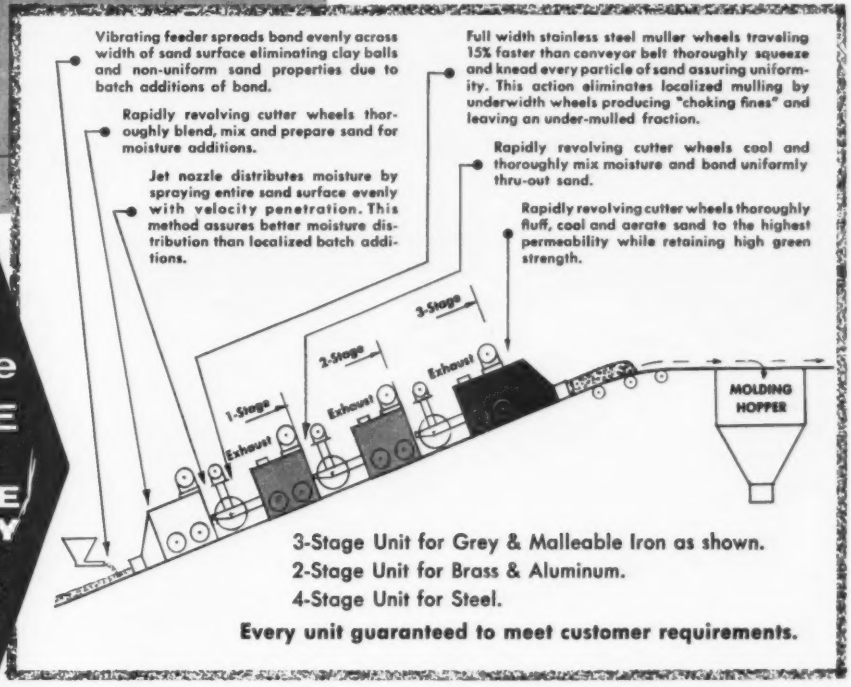
- Minimizes installation costs
- CAN BE USED WITH ANY EXISTING MIXING EQUIPMENT

FOR **1/3** the **PRICE**

You can get **3 TIMES THE CAPACITY** with the simple and efficient Pekay Mixer Muller


Vibrating feeder spreads bond evenly across width of sand surface eliminating clay balls and non-uniform sand properties due to batch additions of bond.
Rapidly revolving cutter wheels thoroughly blend, mix and prepare sand for moisture additions.
Jet nozzle distributes moisture by spraying entire sand surface evenly with velocity penetration. This method assures better moisture distribution than localized batch additions.
Full width stainless steel muller wheels traveling 15% faster than conveyor belt thoroughly squeeze and knead every particle of sand assuring uniformity. This action eliminates localized mulling by underwidth wheels producing "choking fines" and leaving an under-mulled fraction.
Rapidly revolving cutter wheels cool and thoroughly mix moisture and bond uniformly thru-out sand.
Rapidly revolving cutter wheels thoroughly fluff, cool and aerate sand to the highest permeability while retaining high green strength.
3-Stage
2-Stage
1-Stage
Exhaust
Exhaust
Exhaust
MOLDING HOPPER

3-Stage Unit for Grey & Malleable Iron as shown.
2-Stage Unit for Brass & Aluminum.
4-Stage Unit for Steel.

Every unit guaranteed to meet customer requirements.

THE ADVANCE PEKAY MIXER MULLER FEATURES:

- 3 to 300 T.P.H. of superior quality molding sand. Only one (1) Pekay Muller required for this capacity.
- Separate mixing, mulling and aerating phases, a Pekay exclusive. Each phase is designed and engineered to properly perform its individual function.
- Lower inertia rotating parts that reduce horse power to less than ½ required by batch mixing.
- Accessible, wear-resistant parts reducing maintenance to absolute minimum.
- Continuous mixing and mulling while conveying with no discharge time required and no costly elevator problems.
- No lost production due to mechanical breakdown another Pekay exclusive. Individual sectional drives overcome complete unit stoppage. Should breakdown occur in any part of machine, remaining sections continue to properly condition sand.
- Progressive cooling due to removal of heat by the Pekay exclusive "air-thru-sand-shower" process.
- Lower height requirements eliminating costly high buildings, unnecessary pit excavations and building alterations.

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GARDNER DENVER

Here's the compressor package you can spot in any corner of your plant, hook up and put to work. Foundation specifications are modest. It's a champion on performance, too—noted for two-stage, water-cooled efficiency. And it's a champion with staying power. Years without the touch of a wrench is not unusual for Gardner-Denver quality WB machines. Capacities from 142 to 1150 c.f.m. displacement. Write for Bulletin WB-10, or call your local Gardner-Denver compressor specialist. Gardner-Denver Company, Quincy, Ill.

Space-saving champ

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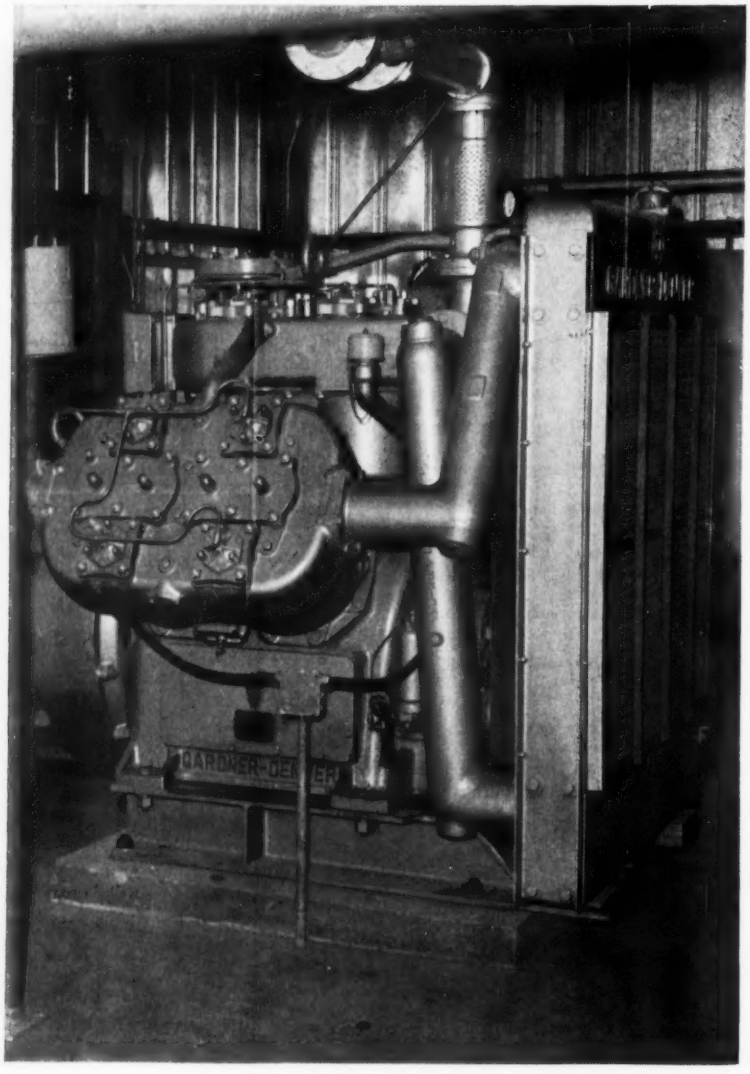


heads, fulcrums, and other parts.

First Complete Study—An accurate measurement of malleable iron's long-term corrosion resistance never has been made. In 1955, however, the late W. A. Kennedy, then supervisor of products, the Grinnell Corp., Providence, R. I., and the writer—chairman and secretary, respectively, of Committee A-7 on Malleable Iron Castings and members of the society's Advisory Committee on Corrosion—interested both committees in corrosion exposure tests of malleable iron.

It was decided to expose both as-cast and machined plates, 4 x 6 x ¼ in., to the atmosphere for periods of 1, 3, 7, and 12 years at two marine, one rural, and two industrial sites. The ASTM had such exposure test lots available at Kure Beach, N. C., Point Reyes, Calif., Newark, N. J., East Chicago, Ind., and University Park, Pa.

Exposure Site Near Ocean

The exposure site selected at Kure Beach is only 80 ft from the ocean and provides a salt-laden atmosphere a large part of the time. Comparable conditions prevail at Point Reyes. Industrial atmospheres are encountered at East Chicago and Newark, while the rural atmosphere at University Park is most conducive to longevity from the standpoint of corrosion.

Test specimens totaling 120 plates each of standard malleable, copper-bearing standard malleable, and pearlitic malleable, were supplied by Eastern Malleable Iron Co. Similar quantities of standard malleable and two grades of pearlitic malleable were furnished by Link-Belt Co. Albion Malleable Iron Co. and National Malleable & Steel Castings Co. each supplied 120 plates of standard malleable, and Central Foundry Div., General Motors Corp., and Wagner Malleable Iron Co. each supplied an equal number of pearlitic malleable plates.

These specimens provided an excellent coverage of material produced to ASTM Standard A-47-58 for Malleable Iron Castings and ASTM Tentative Standard A-47-58T for Pearlitic Malleable Castings.

Provide Comparison—It was also decided by the two committees to include three sets of rolled steel plates and two sets of nodular iron plates in the test racks. The steel

Circle 615 on Page 53

plates, provided by C. P. Larrabee, of the Advisory Committee on Corrosion, and United States Steel Corp., included structural carbon steel, structural copper-bearing steel, and high-strength low-alloy steel. F. L. La Que, International Nickel Co., another committee member, supplied 120 pearlitic ductile iron plates and 120 similar but ferritic plates through the courtesy of his company and Textile Machine Works. These plates represent material covered by ASTM Standard A-399-57.

One-half of each set of cast plates was machined by the Allith-Prouty Co. top and bottom. Each of the 1620 plates was weighed to milligram accuracy and packaged by Chain Belt Co. for shipment to the various exposure sites where racks and accessories were provided by the ASTM committee.

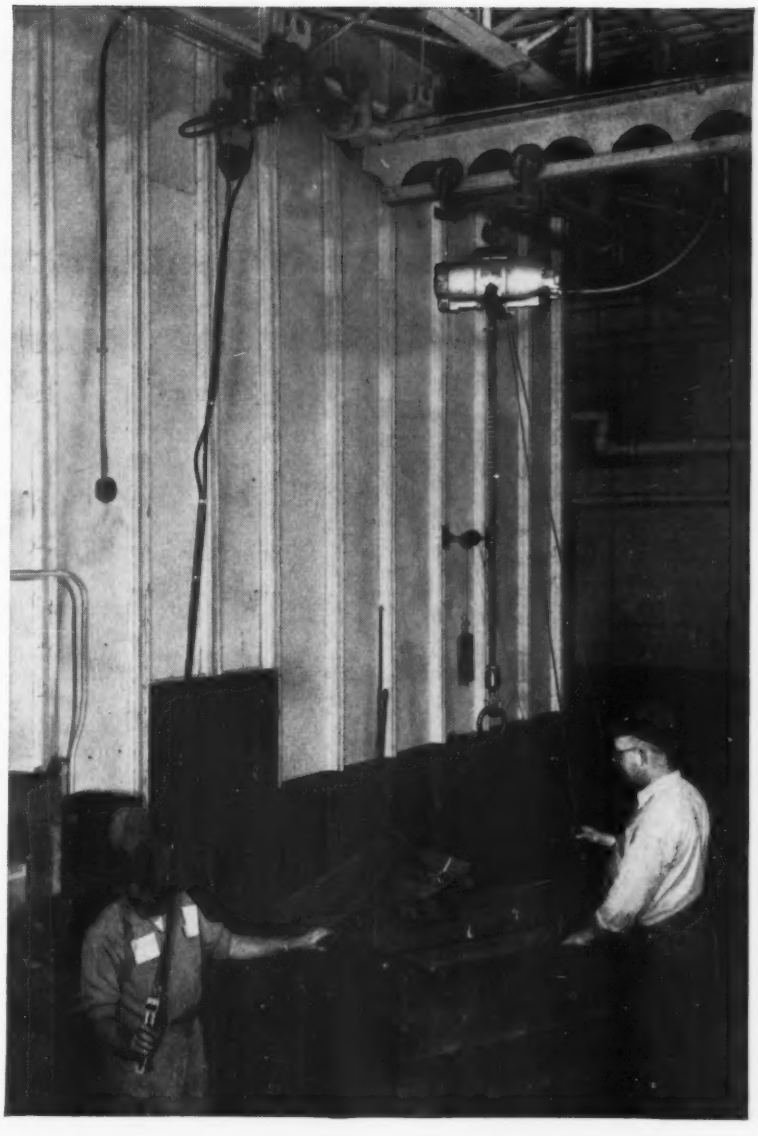
Specimens in Place—Last May 12 the A-7 Corrosion Test Subcommittee mounted the specimens at Kure Beach, assisted by personnel of International Nickel Co., which has a corrosion test laboratory there. The group also established practice to be followed when installations were made under the direction of the committee in subsequent weeks at the four other sites.

At the end of 1, 3, 7, and 12 years, three plates of each material—both machined and unmachined—will be removed at each site.

They will be cleaned carefully, then weighed accurately on the same scales which recorded their original weight. As time progresses, ASTM will be able to provide valuable data for determining what annual corrosion loss may be anticipated over various extended periods.

In addition, malleable plates have been supplied for galvanized coated tests. These tests are among those being conducted by ASTM Committee A-5 on Corrosion of Iron and Steel through its Subcommittee XVI on Hardware Tests.

Members of the A-7 Corrosion Test Subcommittee include the following: Chairman, W. M. Albrecht, Chain Belt Co.; vice chairman, L. C. Marshall, Link-Belt Co.; Gordon B. Mannweiler, Eastern Malleable Iron Co., chairman of the Research and Technical Council, Malleable Founders' Society, a supporter of the corrosion work; and the author.



Two-Way Team

spots loads easily, safely

Two-way team for two-way power. The man at the right lifts and moves loads of patterns along 20 feet of traveling bridge. The man at the left moves the entire load (patterns, hoist and beam) to any location within 50 feet of travel. This unusual combination of Gardner-Denver hoist and "Hoistractor" can add economical push-pull power to any materials-handling operation. Write for Bulletins 86-1 (hoists) and 87-1 (Hoistractors).

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Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Avenue, Toronto 16, Ontario

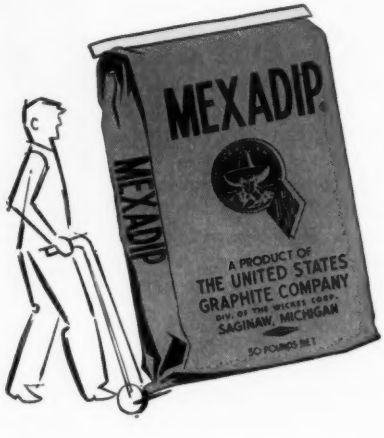
Circle 616 on Page 53

WASHES · WAS

no matter what the application . . . there is Mold Wash for every foundry need . . . or

SIPAC®

with only the addition of water, produces a bright, gold-colored coating with fine, smooth surfaces, using any foundry sand. It's non-carbonaceous and inert and will not react with any molten metal, including grey iron and steel. Resists flaking and completely protects core surfaces. You get improved casting quality. Sipac is available in 55 gallon drums, ready for mixing and dilution to desired Baume—even to a scale of 32—without settling.



MEXICAN® VV FLAKE ("volatile vehicle")—meets the growing demand for good mold and core wash suited to carbon dioxide mold-core hardening process. Completely compatible with isopropyl alcohol, oleum spirits, kerosene or similar agents, Mexican VV Flake provides extra refractory protection . . . improves skin hardness . . . gives better casting quality. Comes in paste form, suitable for application by spraying or dipping.

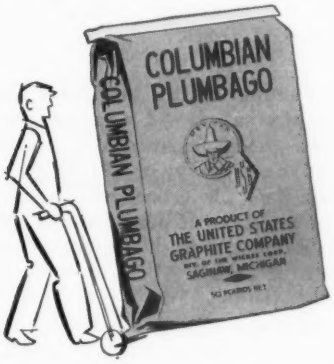
MEXADIP®—refractory core coating containing its own binder, requires only water to prepare it for use. Will not ferment, produces a very uniform, even coating over entire core with practically no sagging, running or dripping. Use it throughout foundry for green or baked cores, ferrous or nonferrous foundry practice.

THE UNITED STATES

GRAPHITAR® CARBON-GRAPHITE • **GRAMIX®** POWDERED METAL PARTS • **MEXICAN®** GRAPHITE PRODUCTS • **USG®** BRUSHES

HES · WASHES

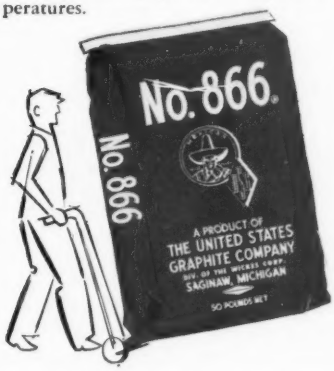
a United States Graphite Company Core or one may be engineered to your requirement



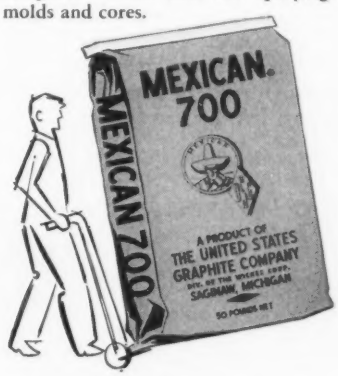
MEXICAN® COLUMBIAN PLUMBAGO— versatile wet blacking used for loam work, green or dry sand or torch dried molds where soft coat with high resistance is required. Suitable for all types of castings, including those of over 25 tons, high steel mixtures and castings poured at high temperatures.

SLICK RITE® — compounded from a base of high quality flake graphite to produce best slicking qualities, Slick Rite is applied to green sand molds by hand rubbing, tooling or brushing. Excellent casting quality obtained when mixed with water and molasses to produce wet lead for spraying molds and cores.

MEXICAN® 172—high refractory wet blacking with binder. For application to both molds and cores of heavy sectioned castings where best possible finish is required under severe pouring conditions.



No. 866® — is a wet blacking without binder. Provides soft coating with good refractory properties for molds and cores of medium and light sectioned castings. Also makes good blacking for bell end cores in pressure pipe manufacture. Can be applied by spraying, brushing or swabbing at 40-45 Baume.



MEXICAN® 700 — is particularly suitable for large molds and dry sand cores of high carbon iron such as cast iron rolls and ingot mold castings poured at intermediate temperatures. Contains no binder.

Write today for engineering bulletin No. 17 giving complete details and application methods of core and mold washes for all ferrous and nonferrous foundries.

GF-244-2

GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION, SAGINAW 14, MICHIGAN

Industry Briefs

● **BLAW-KNOX CO.**, Pittsburgh, has made a proposal to purchase for cash the assets, exclusive of cash and receivables, of Aetna-Standard Engineering Co., Pittsburgh. Aetna-Standard has plants in Warren, Ohio, and Ellwood City, Pa. A foundry is operated in the latter city.

Crawford Steel Foundry Co., of Bucyrus, Ohio, was destroyed by fire on Dec. 17. Damage is estimated at $1 million. Sale of the company to Miller Mfg. Co., a Detroit holding company, was announced the day before.

New Jersey Zinc Co. has established a new sales district for southern California. John S. Collbran Jr., formerly western district sales manager at Chicago, will serve as Pacific district manager, with headquarters at Los Angeles.

Solon Foundry Inc. and its divisions—S.O.M. Precision Industries Inc., Alloys Heat Treating Co., all in Solon, Ohio, and Associated Foundries, Cleveland—are undergoing an expansion and improvement program in facilities and sales organization, which will more than triple capacity. A. M. Hubman is president.

Imprex Inc., Milwaukee, formerly Imprex Div. of Ideal Industries, has been purchased by T. W. Juday, its general manager for the last 4½ years. The company manufactures impregnation equipment and sealants used to seal porous castings and also performs impregnation services.

Whitehead Metals Inc. is the new name of the former Whitehead Metal Products Co. Inc., New York. The company distributes nickel, copper, aluminum, and stainless alloys and maintains offices and warehouses in New York, Baltimore, Buffalo, N. Y., Cambridge, Mass., Harrison, N. J., Philadelphia, Rochester, N. Y., Syracuse, N. Y., and Windsor, Conn.

Morton Castings Inc., 1686 Anthony Ave., Bronx, N. Y., has been incorporated by Marlene March, Robert E. March, and Eva Massar, Far Rockaway, N. Y.

RESEARCH CENTER—Harbison-Walker Refractories Co. recently opened this new research center about 12 miles southeast of downtown Pittsburgh. It is named in honor of its president, Earl A. Garber, and provides 45,000 sq ft of floor space. An enlarged staff will work on both fundamental and applied research

Electro Metallurgical Co., division of Union Carbide Corp., has changed its name to Union Carbide Metals Co. The company will continue to produce and sell a full line of ferroalloys, metals, metal chemicals, and metallurgical products under the Electromet trademark and its brand names.

Bunting Brass and Bronze Co., Toledo, has created a research and development department to be under the direction of Dr. Ralph A. Schaefer. Dr. Schaefer holds many patents and has done research and development work in the sleeve bearing field.

Foundry Equipment Corp., in care of Henry R. Dean, 1775 Broadway, New York, has been incorporated by Syd Leviton, Max Posner, and Joseph Schrank, 67 West 44th St., New York.

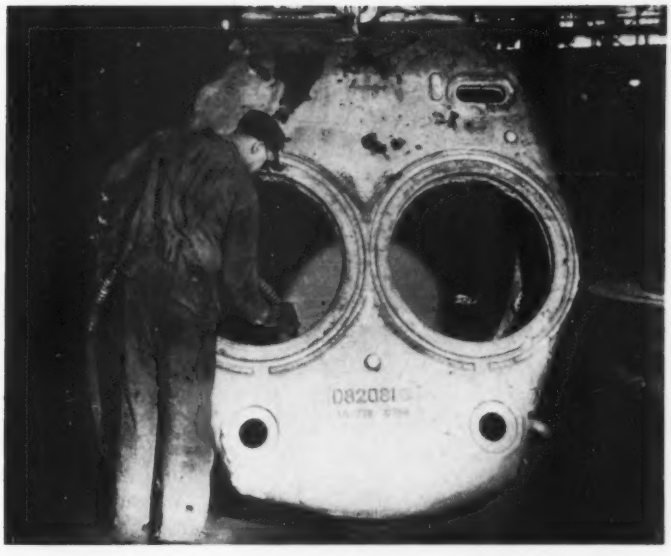
Koppers Co., Pittsburgh, plans start of construction of a new research center at Monroeville, Pa., near Pittsburgh. The company expects to triple its research activities during the next ten years.

Apex Foundry Inc., Detroit, is making an addition to its plant which includes installation of a new coreroom.

Arizona Machine & Casting Corp., formerly Phoenix Pattern & Mfg. Corp., has opened its new plant on the Old Casa Grande Highway at Jaynes Station, Tucson, Ariz. Harold Snyder is president and Charles Hobbs, vice president.

Industrial Heating Equipment Association reports November orders for industrial furnaces totaled $5,597,000, up 80 per cent from October volume. While sales for the first 11 months of 1958 were down 38 per cent from the year before, orders placed from July through November were comparable for the two years.

Portable Conveying Systems Trim Foundry Costs



Profits Up—Costs Down

In today's modern foundry, material handling, the production cleaning of molds and castings, plus related expenses are frequently an appreciable percentage of production costs—in some cases running as high as 25 to 30%. Therefore, even a 10% reduction in handling costs will provide the equivalent of a substantial increase in sales.

Eliminates Manual Handling

Executives seeking methods to cut down on production and maintenance costs can find a relatively inexpensive solution to their handling problems in the new *Award Winning* Hoffco-Veyor portable conveying units. These versatile units have trimmed costs in the foundry, brick, chemical and other manufacturing industries. Many pick up and disposal functions formerly handled manually are now the responsibility of Hoffco-Veyors. From either a fixed location or at various points in the plant, the one-man operated Hoffco-Veyor keeps materials moving rapidly to provide substantial time, labor and product savings.

Industrial "Work Horses"

Veritable "work horses," Hoffco-Veyors handle a wide range of rugged duty jobs such as conveying shot blast, gritty substances, sand, etc. Meeting the toughest foundry demands, they recover spent shot, clean molds, pick up spilled materials and empty drums among other tasks. In their flexible handling of all types of heavy duty chores, they offer these advantages:

- Rapid pneumatic loading and unloading of hoppers and containers.
- Higher production levels through reduced downtime.
- Easy maneuverability in crowded or virtually inaccessible areas.
- Can be hooked up to stationary piping for reaching remote areas.
- Streamlined design and compact construction assures years of dependable operation – minimum maintenance costs.
- Simple adaptor cover permits use of standard 55 gallon drums as auxiliary collectors.
- No dangerous moving parts.
- Low in first costs.
- Flexible enough for use as a vacuum cleaner – unit equipped with inlet valve to take standard size 1½ to 2 inch vacuum hose for ordinary cleaning operations when not in use as a conveyor.

Efficient, Inexpensive Vacuum Cleaning

As a vacuum cleaner, the Hoffco-Veyor can be used for general foundry cleaning. In contrast to expensive compressed air which defeats the purpose of good housekeeping by blowing dust and dirt about, Hoffco-Veyors vacuum clean and remove dust and dirt from equipment, walls and floors. Vacuum cleaning of molds and cores greatly reduces the occurrence of sand inclusions in casting surfaces. Substantial savings also accrue from improved product finish together with a reduction in welding and other operations in casting cleaning rooms. Moreover, healthier working conditions increase plant efficiency.

Savings In Your Foundry

If your foundry is using a non-automatic method of handling and cleaning, the Hoffco-Veyor can help you obtain higher profits today and in the years to come. Send for the free booklets describing how portable Hoffco-Veyors and stationary systems will cut operating and maintenance costs in your foundry—pay for themselves in materials savings alone. Mail coupon today.

Kindly send the following FREE booklets.

U.S. HOFFMAN MACHINERY CORPORATION

Dept. FL
Air Appliance Division
103 Fourth Avenue
New York 3, N. Y

☐ PB 502. How a Portable Hoffco-Veyor Trims Foundry Operating Costs.

☐ AB-100. How Stationary Vacuum Systems cut costs, increase efficiency.

NAME..... TITLE.....

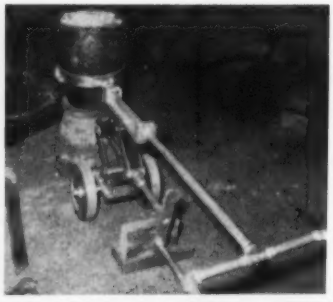
COMPANY.....

ADDRESS.....

Circle 617 on Page 53

HOW To Do It

FOUNDRY will pay a minimum of $15 for each "How To Do It" idea submitted and published



One Man Operates Crucible Carrier

By MONROE DAVIS
Davis Foundry
Portland, Oreg.

METAL POURING and transporting device is made with an automobile jack, some pipe, odds and ends of metal, and two wheels. It handles a number 20 pot but is strong enough to handle a larger pot if necessary. It has been a big help to me in pouring off molds because I work alone producing small castings in aluminum, brass, and bronze.

Now that the bugs have been worked out of this hand-operated device, I am considering making one with storage battery-operated oil pump and hydraulic jack with up and down pushbutton controls on the shank handle.

AFS Nominates Officers and Directors; Recipients of 1959 Awards Are Named

● NOMINATIONS for officers and directors of the American Foundrymen's Society, subject to election at the 63rd Castings Congress in Chicago in April, have been made by the AFS Nominating Committee.

Charles E. Nelson, technical director, Magnesium Div., Dow Chemical Co., Midland, Mich., is the presidential nominee for 1959-60. He is the current vice president.

Norman J. Dunbeck, vice president, Industrial Mineral Div., International Minerals & Chemical Corp., Skokie, Ill., has been nominated for vice president.

Directors named to three-year terms are Norman N. Amrheim, president, Federal Malleable Co., West Allis, Wis.; Cecil N. King, plant manager, Chrysler Foundry, Detroit Chrysler Corp., Detroit; Robert E. Mittlestead, metallurgist, Lectromelt Casting Div., Akron Standard Mold Co., Barberton, Ohio; A. J. Moore, executive vice president, Canadian Bronze Ltd., Montreal; William H. Oliver, general manager, Bond Plant, American Radiator & Standard Sanitary Corp., Buffalo; James N. Wessel, metallurgist, Puget Sound Naval Shipyard, Bremerton, Wash.

AFS Awards — Nine men have been selected by the AFS Board of Awards to receive awards and citations at the annual meeting in Chicago. Gold medal recipients will include the following:

John H. Whiting Gold Medal— To Harold W. Lownie Jr., chief, Metallurgy Research Div., Battelle Memorial Institute, Columbus, Ohio.

Peter L. Simpson Gold Medal— To John A. Rassenfoss, manager, Manufacturing Research Laboratory, American Steel Foundries, East Chicago, Ind.

John A. Penton Gold Medal — To Fred J. Walls, vice president research and development, Engineering Castings Inc., Marshall, Mich., and retired district manager, International Nickel Co., Detroit.

Awards of Scientific Merit will be presented to Robert H. Mooney, division works engineer, Central Foundry Div., General Motors Corp., Saginaw, Mich.; Howard H. Wilder, manager of engineering sales, Vanadium Corp. of America, Chicago; and Elmer C. Zirzow, director of foundry service, Werner G. Smith Inc., Cleveland.

Service Citations will go to James R. Allan, president, Allan Industries, Melbourne, Fla., and retired manager, Industrial Engineering & Construction Dept., International Harvester Co., Chicago; Bernard D. Claffey, vice president, Dayton Malleable Iron Co., Dayton, Ohio; and Roy W. Schroeder, professor, Dept. of Mechanical Engineering, University of Illinois, Chicago Div.

Fenn College Offers Course Covering Foundry Principles

The Technical Institute of Fenn College, Cleveland, will offer a course in "Foundry Principles" beginning Feb. 18. The two-hour sessions are held each Wednesday for 16 weeks.

This is a lecture course and includes discussion on foundry job potentialities; theory and solidification of metals; mixing, testing, and control of sand; pattern principles; plaster and investment molding; shell molding; centrifugal casting; permanent mold work; die casting; testing and inspection methods for castings, and the metallurgy of gray iron, malleable iron, steel, and copper-base, aluminum, and magnesium alloys.

Edward Trela, research metallurgist, Apex Smelting Co., teaches the course. Registration is Feb. 9 through 13, and tuition is $31.

COLEMAN OVENS

reduce waste . . .
lower costs

in every type of foundry

You can reduce casting scrap . . . CUT YOUR LABOR, MATERIAL AND FUEL COSTS by baking cores and drying molds in Coleman Ovens. Small and large foundries alike find that Coleman Ovens are vital to better quality castings and increased profits.

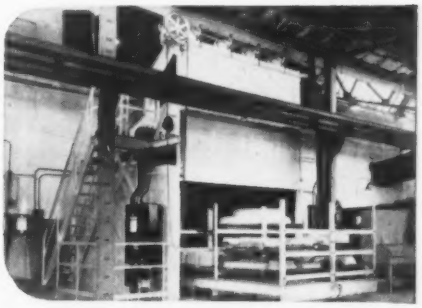
Coleman Ovens quickly pay for themselves out of direct savings in labor, materials and reduced casting scrap.

Coleman Engineers have pioneered and developed the most efficient oven designs to meet the highly specialized needs of modern foundry methods in all classes of work—grey iron, malleable, steel, alloy, brass, aluminum and magnesium.

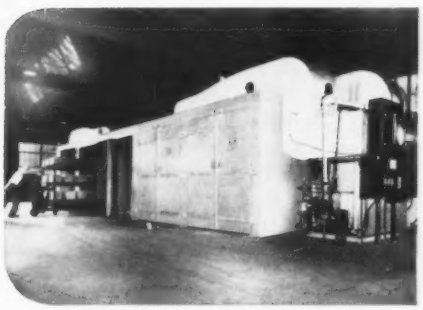
Profit by this experience — let us recommend, at no obligation, the Coleman Oven for your needs.

Write for Bulletin 54

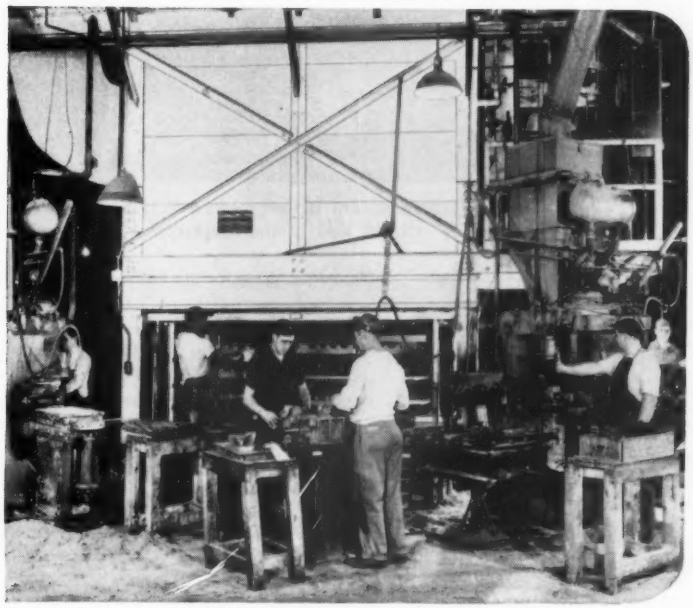
Coleman Dielectric Core Oven



Coleman Car-Type Oven



Coleman Transrack Ovens



Coleman Tower® Oven

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

Tower Ovens • Horizontal Conveyor Ovens
Car-Type Core Ovens • Car-Type Mold Ovens
Transrack Ovens • Rolling Drawer Ovens
Portable Core Ovens • Portable Mold Dryers
Dielectric Core Ovens

THE FOUNDRY EQUIPMENT COMPANY
1821 COLUMBUS ROAD **CLEVELAND 13, OHIO**

WORLD'S OLDEST AND LARGEST FOUNDRY OVEN SPECIALISTS

Circle 618 on Page 53

Molding Line Features

AUTOMATIC HANDLING

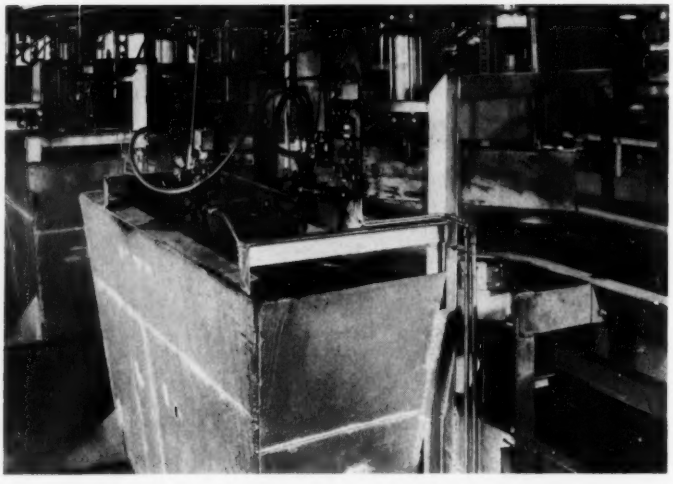


Fig. 1—Balcony level of the sand distribution system. An automatic plow (right front) directs sand into the hopper

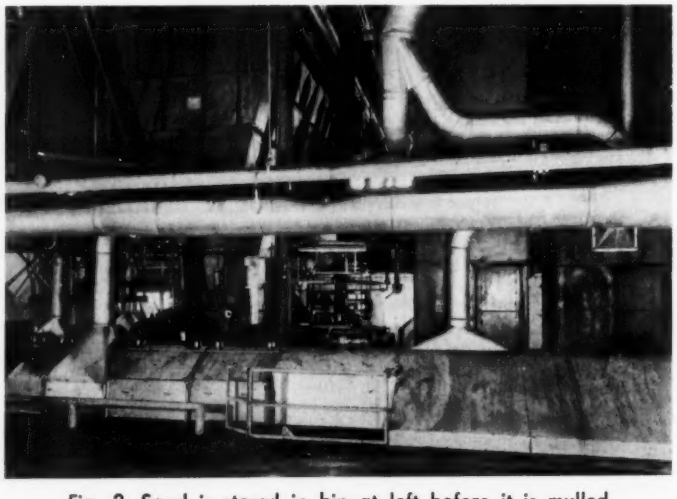


Fig. 2—Sand is stored in bin at left before it is mulled. Bucket elevator is at right side of the illustration

● TWO COPE and two drag molding machines on the No. 9 foundry line at Pontiac Motor Div., General Motors Corp., Pontiac, Mich., can produce as many as 448 molds 30 x 48 x 18 in. per hour.

Features of the line include automatic sand handling and distribution, an automatic shakeout system, and an automatic casting-cooling, basket-loading system. The line produces a variety of small automotive parts.

Sand Handling—The entire sand system for the No. 9 line contains 500 tons of sand, 350 of which are handled hourly by the automatic sand mixing and distributing system.

Sand from the shakeout is returned to the system by conveyor belt. When it reaches the sand handling system, it is lifted by a bucket elevator and spilled on a vibrating screen which eliminates foreign materials. After it has been screened, the sand falls into a storage bin.

After storage, it goes through a continuous muller, is fed to the prepared sand elevator, below floor level, and is lifted 83 ft to a conveyor belt system which feeds it to one of two storage bins. As sand is needed for the molding operation, it is fed to a distribution conveyor belt equipped with automatic plows which direct sand into the molders' hoppers. Spilled sand and strike-off sand from the molding machines are caught by a belt conveyor in the basement and returned to the prepared sand elevator.

Automatic Shakeout — Poured molds are carried by the mold car conveyor to the shakeout area, where the cope tipper mechanism strips off the cope flask without stopping the conveyor. The cope is inverted and dropped onto the shakeout unit. An oscillating table shakes out the sand, which falls through the unit and is collected for return to the sand system.

After this operation, the cope flask is pushed up an incline by air cylinder sweeps. Rigid control of flasks is required because they must be properly spaced when they reach a 90-degree turn at the top of the incline.

At the turn, an air cylinder pushes the flasks onto a powered belt conveyor for return to the molding machines. At the cope molding area, flasks are lowered to floor level and transferred to a roller flight conveyor. This point is the

let's look at the figures

When it comes to choosing the right core oil for making your casting, there are 10 figures to check before making your decision. They are the 10 reasons why there is a grade of Penolyn Core Oil to meet the most exacting requirements of every Foundry and Core Room practice. Look at the figures and you'll—

If you require expert technical assistance or technical data regarding your present or future casting operations, just call the Penola office nearest you. Or write: Penola Oil Company, 15 W. 51st St., New York 19, N. Y.

Penola

specify PENOLYN CORE OIL

for these 10 important casting advantages:

1. Dependable uniformity
2. Concentrated form
3. No obnoxious odor
4. Seepage eliminated
5. No crusting, green mix
6. Always clean working
7. Wide temperature range
8. Polymerized formulation
9. Minimum gas
10. Ample collapsibility

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Circle 619 on Page 53

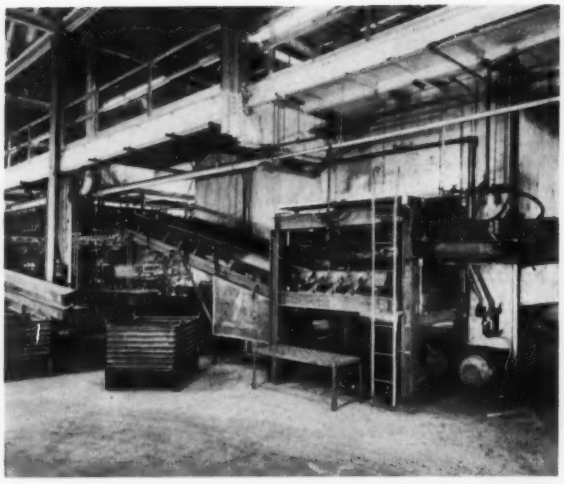


Fig. 3—At 90-degree turn, air cylinder pushes cope flask onto elevated power conveyor belt

Fig. 4—Mechanism strips 500-lb cope flask off drag flask pins and drops it to shakeout unit

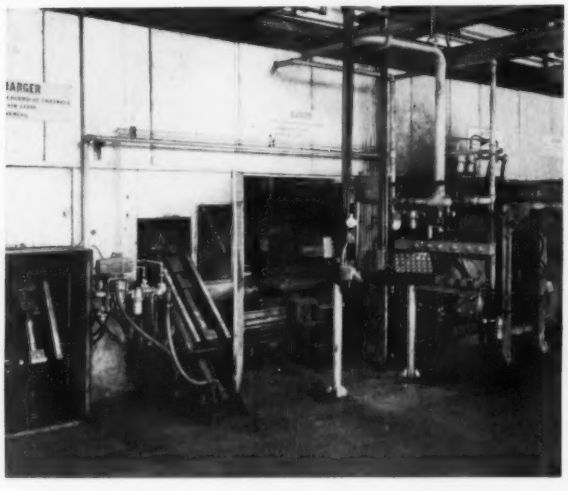


Fig. 5—Illustration shows the general shakeout area and the attendant control station

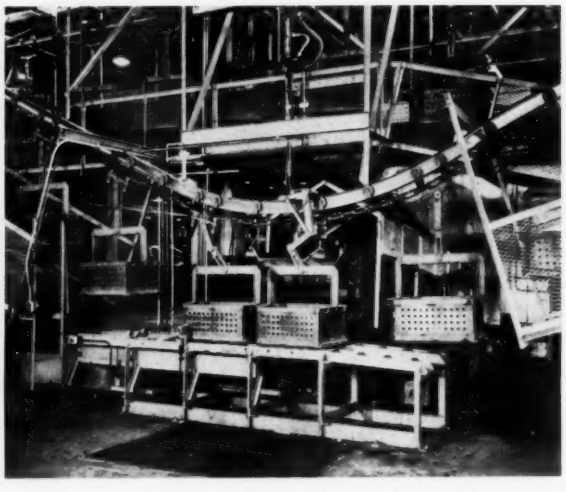


Fig. 6—On automatic casting cooling line, at least one basket always is in position

end of the automatic cope handling installation. Cope flasks next are picked up by a manually operated mechanical hoist and placed on the molding machine.

After the cope flask has been stripped from it, the drag flask stays on the mold car conveyor. When it reaches the drag shakeout area, and air cylinder pushes it off onto the drag tipper table, which raises the drag flask onto its side and throws the hot casting onto an oscillating shakeout unit. Castings are carried to the cooling line by an oscillating conveyor.

The drag flask is lowered to its original position, and an air cylinder pushes it onto another shakeout unit which removes sand from it by oscillating action. Sand is collected below the shakeout unit and returned to the sand system. Another air cylinder pushes the empty flask onto an S-curved, powered roller conveyor which carries it to the drag molding machines. While on the S-curved conveyor, drag flasks cannot jam, but are allowed to touch. At the end of the S-curve, the flask is carried onto a roller flight conveyor. Like the cope flasks, the drags are picked up and placed on the molding machines by a manually operated mechanical hoist.

This shakeout system is controlled by one man at a master control board. The entire shakeout area is enclosed to exhaust dust.

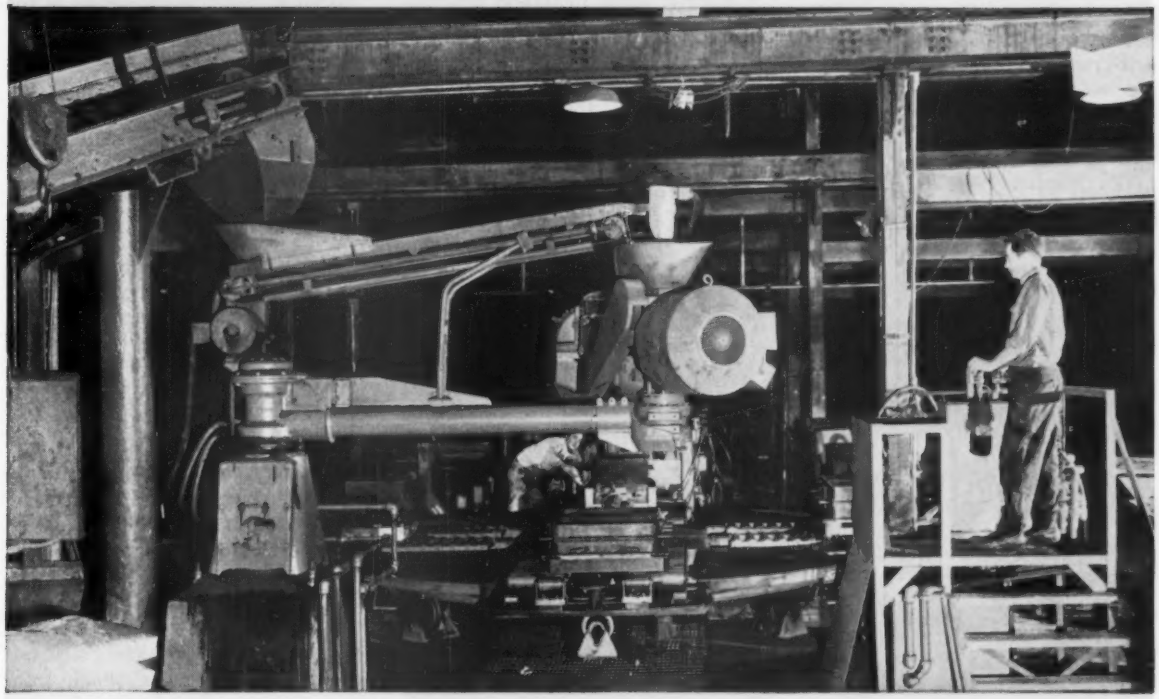
Casting Cooling—The automatic casting - cooling, basket - unloading system makes it possible to load hot castings into the cooling baskets without stopping the line or removing the baskets for unloading. Baskets in which castings are cooled are suspended from a trolley conveyor. An oscillating loading conveyor continually shakes hot castings into the baskets, and at least one basket always is in position to receive the castings.

The automatic sand handling and shakeout systems were designed and installed by Planet Corp., Lansing, Mich.

GO OUT AND BUY CASTINGS?

BUILD A NEW PLANT?

MECHANIZE EXISTING PLANT?



BROWN & SHARPE'S CHOICE...

Inadequate foundry facilities left Brown & Sharpe, one of the world's outstanding machine tool producers, with only three courses. They would have to go out and buy castings from a jobbing foundry, build a new foundry, or completely revitalize their existing set-up through mechanization.

A staff of engineers studied the problem thoroughly. Because of the difficulties involved in developing new casting sources for their quantity and type of castings, a new foundry looked like the only way out, yet, management knew that the huge investment required would create a real overhead problem.

Then, the engineers investigated the tremendous flexibility and low cost of Hydra-Slinger mechanization. Mechanization of the existing foundry became the only logical course to follow. Now, Brown & Sharpe's largest molds—weighing up to five tons—are made on a Hydra-Slinger "Figure 9" Loop Conveyor Unit. Smaller work is handled on a Hydra-Slinger Roto-Mold Unit, served by a B&P Rol-A-Draw. An added assurance of quality and production is provided by a Model "60A" Speedmullor, which prepares the foundry's molding sand.

Brown & Sharpe's mechanization has paid off.

1. They avoided the huge investment required by a new plant.
2. Existing space and facilities have been utilized to provide all of the production needed.
3. The company has been able to obtain cost and control advantages by producing its own castings.

B&P mechanization can pay off in other ways, too. Write now!

BEARDSLEY & PIPER

Div. Pettibone Mulliken Corp.
2424 N. Cicero Avenue
Chicago 39, Illinois

Circle 620 on Page 53

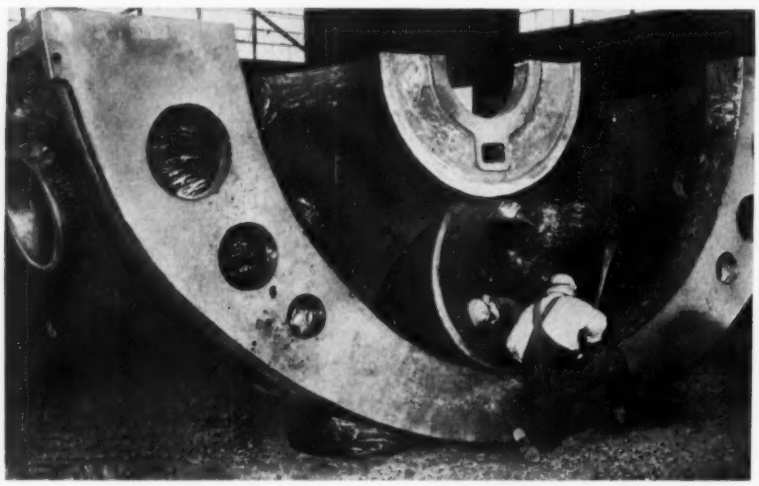
Foundry Developments

By EDWIN BREMER
Metallurgical Editor

Large One-piece Core

ACCOMPANYING illustration shows a 51,000-lb exhaust casing made to close tolerances with minimum costs by the Foundry Div., Chambersburg Engineering Co., Chambersburg, Pa.

By use of cement-bonded sand, a one-piece core was produced without corebox or arbors. Mold was made first and then the core, weighing 24 tons, was made within the skeleton pattern equipment in the mold, resulting in an accurate re-



production. Core was removed and after checking mold and core for accuracy, the latter was placed back in the mold.

Natural hardening of the cement-bonded sand and its high strength made it possible to produce the core with minimum reinforcing and no special equipment.

Sand Is Like Putty

NEW molding process for close-dimensional tolerances, employing zircon sand bonded with a water base high-temperature phosphate, is described in the Nov. 20, 1958, issue of *Foundry Trade Journal*, London, England. Casting costs are said to lie between those for the investment and sand molding procedures.

After mixing with the binder, the sand is plastic and has high cohesive properties; it resembles glaziers' putty rather than sand. Molds can be made by hand or pneumatic ramming, using hydraulic pressures up to 5½ tons per sq in., and blowing combined with hydraulic pressure.

Termed the Alphax process, the molds may be hardened or set by air drying, oven heating, or gassing with ammonia. Prior to use the molds are fired at about 1380° F. In the case of some nonferrous alloys, baking at 230 to 300° F is satisfactory. Mold temperatures at pouring may vary between 490 to 930° F.

Strong Stuff

STUDIES of heat treatments and physical properties of high-strength steel castings to provide them with the transverse physical properties of steel forgings is described in "Investigation of Heat Treatments and Mechanical Properties of High-Strength Steel Castings" by J. W. A. Tyler and P. J. Ahearn.

It states that SAE 4340 steel castings modified with 0.15 per cent vanadium can be heat treated to a strength level of 280,000 psi with a yield stress at 0.1 per cent offset of 200,000 psi. High-silicon steel castings can be heat treated to 290,000 psi tensile with a yield stress of 215,000 psi.

No appreciable difference appeared in physical properties of the two analyses except that ductility of the silicon steel may be lower. Report is designated PB 131638 and may be obtained from the Office of Technical Services, Department of Commerce, Washington 25, for $1.

Resist Corrosion

SIX titanium alloys tested at the Bureau of Mines, College Park, Md., have about the same corrosion resistance as unalloyed titanium, according to a recent report. Alloys in addition to pure titanium included Ti-Al-Sn, Ti-Cu, Ti-Al, and tests were conducted in synthetic ocean water, tapwater, 1 per cent sodium hydroxide, 5 per cent ferric chloride, 5 per cent ammonium sulfate, mineral acids, and 1 per cent oxalic acid.

Details are presented in Report of Investigations 5423, "Chemical and Galvanic Corrosion Properties of Titanium Alloys" available from Publications - Distribution Section, Bureau of Mines, 4800 Forbes Ave., Pittsburgh 13.

Cast Hinges Are Better

MALLEABLE iron hinges have replaced those formerly made from rolled steel sections on all 1959 General Motors Corp. automobiles. Conversion to malleable iron has eliminated shearing and forming operations required on the rolled steel sections, and permits easier machining.

In addition to those, the use of stress analysis in design has enabled production of cast hinges which are lighter in weight and of better appearance.

Central Foundry Div., General Motors Corp., Defiance, Ohio, currently is casting over a million front door hinges per month of malleable iron.

For Lowest Refractory Costs and Maintenance of Highest Production

HARBISON-WALKER ELECTRIC FURNACE REFRACTORIES

MAXIMUM ECONOMY results from the use of the precise kinds of refractories best suited for each particular set of electric furnace operating conditions. The many destructive factors which affect the service life of refractories can be adequately combatted only by the properly balanced selection of the refractories. Harbison-Walker produces all the different types and classes needed for the widely diversified requirements.

ROOFS STAR, the standard of quality in conventional silica brick, H-W R brand and VEGA the super-duty silica refractory, are preferred for the most severe conditions in electric steel melting furnaces.

Harbison-Walker super-duty fireclay brick made in five states, affording lowest transportation costs and the wide range of high alumina brands comprising all classes from 50% to 90% alumina, provide for the most severe spalling conditions and the highest working temperatures needed for various alloys.

These refractories of special merit are:

Super-Duty Fireclay Brick
ALAMO—DEAN—BOONE—H-W SUPER SAVAGE—KALA

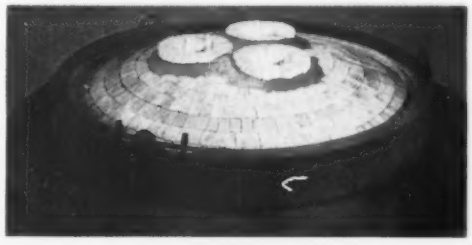
High Alumina Brick

KORUNDAL 90% Al_2O_3	ALUSITE 70% Al_2O_3
ANCHOR—60% Al_2O_3	H-W MULLITE 70% Al_2O_3

In addition to simplified roof shapes of relatively small unit sizes, including various modified 9″ brick, several H-W monolithic refractories of excellent durability, greatly facilitate installation. Leading brands are KORUNDAL RAMMING MIX, H-W HIGH ALUMINA CASTABLE, and APACHE HIGH ALUMINA PLASTIC FIREBRICK.

BOTTOMS H-W C MIX (high purity seawater periclase) used for contour-rammed open hearth and electric furnace bottoms greatly reduces furnace downtime, saves labor and avoids burning-in sacrifice of refractory construction. And with its measurable margin of superior properties, costs are decidedly lower and furnace availability is greatly increased.

SIDE WALLS METALKASE brick are available in several modifications of both chemically bonded and hard fired basic brick, preformed under great pressure and firmly encased in soft steel containers of the optimum



weight for electric furnace use. This refractory in its several forms is highly resistant to thermal spalling and to corrosion by highly basic slags.

METALKASE XXP are chemically bonded basic brick with two internal plates, formed under high pressure. They are available in various compositions. These internally plated brick have superior spalling resistance and appreciably reduced tendency to peel.

New refractories, products of intensive research, with quality rigidly controlled, H-W technical service and balanced selection based on availability of all kinds of refractories from one source, assure maximum economy.

HARBISON-WALKER REFRACTORIES COMPANY
AND SUBSIDIARIES
General Offices: Pittsburgh 22, Pennsylvania
World's Most Complete Refractories Service

Circle 621 on Page 53

Man to Man

By RALPH L. LEE, *President*

Lee Hobby Foundry
Birmingham, Mich.

"Some folks let their viewpoints about the inevitables of life sentence them to lifetimes of groaning on the rockpile of self-pity"

Foundry Inevitables

•AN ANCIENT philosopher is said to have left a suggestion for those facing the inevitable. And well he might, for it seems that most of our rewarding accomplishments come largely from separating the things that can't be changed from those that can be and steering a course between the two.

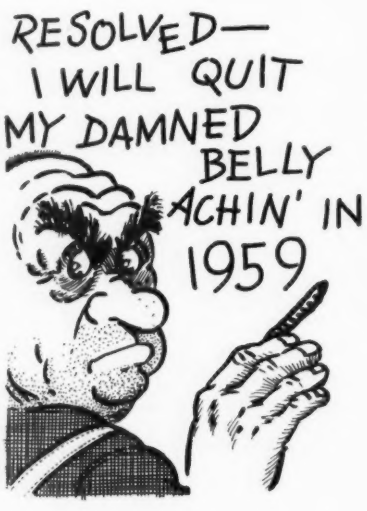
I guess that when you get right down to it, most of the scientific developments for which we raise the flags came from identifying the inevitables and facing up to them—in an enthusiastic frame of mind, of course.

As anyone knows who has tried it, separating the cans from the can'ts is no trifling chore, for much of the time it's almost impossible to tell one from the other. But even when the inevitables are riddled out and labeled, some folks look on them as pickets in a prison fence which hems them in as prisoners. Their viewpoints sentence them to lifetimes of bellyaching and groaning on the rockpile of self-pity. They do as little of what they have got to do as they can possibly get by with. And usually they do that with one hand tied behind them.

A Fortification—On the other hand, this same fence of inevitables serves others as a fortification against the unknown, freeing them to do the jobs they've got, even though they could be better, and even though the bosses they're stuck with lack in so many respects. They let themselves go, just for the heck of seeing what they really can do under the circumstances. I don't think there is a question that the folks in this last group have a lot more fun than the others, nor would it be difficult to tell them apart.

I'm not the least bit nosy as to the personal affairs of others, but it seems to fall to my lot to be sort of a father confessor to foundry folks and others who are far from being happy with the way their businesses or their jobs are going. Thank the Lord, I have even more that are full of beans over the way things are going for them, even in this day and age.

Invariably (Oh, there are some exceptions), the unhappy ones have stories devoted almost entirely to conditions beyond their control which are unjustly preventing them from making the killing they know they are capable of. These conditions include competition, some downright crooked; the company owners' relatives; Shylock treasurers; overeducated highbrows; glory-grabbing supervisors; quality control know-it-alls; egotistical patternmakers; alcoholic melters; inhuman inspectors; and two-faced shop stewards. (This is just a partial list.) The stories rarely include their need for improving their skills, knowledge of the craft, judgment, man-to-man relationships, dependability, and punctuality or plans to make these improvements.



It often is said that most of our progress comes from dissatisfaction with things as they are. I'm not so sure as far as personal progress is concerned—careerwise, that is. I say this because among those in my collection of outstanding craftsmen and businessmen, I don't believe there are many who ever felt they were so far on top of their jobs at any time that they could afford to take the time to bellyache over the sins of commission and omission of everyone whose activities touched theirs. Most of them were promoted to greater responsibility before they felt they had licked their present jobs.

Even though a month late, these are thoughts and observations bearing on the new year. They all stem from the conviction that it's a low-down crime for any of us to work as slaves under the compulsion of con-

Coming in April...

OPERATION MARKETING

A SPECIAL EDITORIAL REPORT

Featuring 5 timely articles on:

EXPANDING THE MARKETS FOR CAST METALS

FOUNDRY's APRIL Pre-Convention issue will feature five "IDEA" articles . . . offering you:

. . . constructive marketing approaches to better business for foundries

. . . a review of business-building ideas which have been tried and found successful by casting producers

. . . a practical approach to the timely problem of how foundrymen can broaden their markets

Watch for this special editorial report in the . . .

FOUNDRY

APRIL 1959 PRE-CONVENTION ISSUE

AFS CASTINGS CONGRESS
and 2nd Engineered Castings Show
Chicago—April 13-17, 1959

1 SETTING UP A MARKET DEVELOPMENT PROGRAM

Planning is the key to broader markets for castings. This report will present a step-by-step approach to the organization of a marketing program for foundries. By George K. Dreher, market development manager, Steel Founders' Society of America, Cleveland.

2 EXPANDING MARKETS WITH CUSTOMER CLINICS

Many foundries have found that customer clinics are effective sales tools. This report by the editors of FOUNDRY is based on a study of seminars and conferences which have been sponsored by various foundry groups for their customers and prospects.

3 IMPROVED DESIGN STIMULATES BUSINESS

There are numerous ways in which redesign of a casting can result in a better and more economical product. Examples of how various parts have been redesigned, and the use of radiography in such development work, are described by Donald F. Richter and John L. Flitz, Central Foundry Division, General Motors Corp., Saginaw, Mich.

4 HOW TO MANAGE FOR PROFITABLE GROWTH

Management must establish realistic objectives based on knowledge of its company's markets and costs. Plans and controls must be formulated to attain those objectives. By Gregory M. Boni, senior partner, Touche, Niven, Bailey & Smart, New York.

5 MANAGING A FOUNDRY PROFESSIONALLY

This presentation will provide a detailed analysis of professional management policies for foundries, with a special look at the importance of new equipment purchases. By Glenn Cook, manager of marketing, Foundry Dept., General Electric Co., Schenectady, N. Y.

63rd CASTINGS CONGRESS and 2nd Engineered Castings Show

AMERICAN FOUNDRYMEN'S SOCIETY

CHICAGO
April 13-17, 1959

FOUNDRY

APRIL 1959 PRE-CONVENTION ISSUE

The APRIL Pre-Convention issue of FOUNDRY will be mailed to reach foundrymen well in advance of the convention.

OPERATION MARKETING

A timely five-part editorial report with lots of "idea" content.

AFS CASTINGS CONGRESS AND SHOW

Complete details on the technical program and convention activities related to the meetings and Show.

FEATURE STORIES AND REGULAR DEPARTMENTS

Regularly scheduled features, Late News, Questions and Answers, and other departments will appear in the APRIL issue as usual.

And in May...

POST CONVENTION ISSUE....

Our editorial staff will record and report the complete story of this year's convention. You'll get the full story in words and pictures in the MAY Post-Convention issue of FOUNDRY.

FOUNDRY

A PENTON PUBLICATION · PENTON BUILDING · CLEVELAND 13, O.

ditions we're stuck with. I also am convinced that the role of slave is largely a matter of viewpoint, not the whiplash of the inevitable.

Let's Experiment—My suggestion for the new year is that we try an experiment. Let's pretend that the jobs we have now, no matter what they are, are the only jobs there are —for us, that is. Let's pretend that all of the conditions affecting us that we can't change will remain unchanged for the duration (of the experiment). Then, within these limitations, let's cut loose on all of the things we known darned well we can do something about, get up off our lazy mental britches and start digging up the answers to the problems we uncover every day in the doing of our work. And this applies to every one from old shakeout man Lee to the general manager of the Lee Hobby Foundry.

This experiment can be dropped at any time by the experimenter, but my guess is that a goodly number will keep on at it for the rest of their days. Maybe they will not make a lot of money, but they'll have fun. And after all, what's money without fun?

Happy New Year to you all.

Describes Welding Symbols

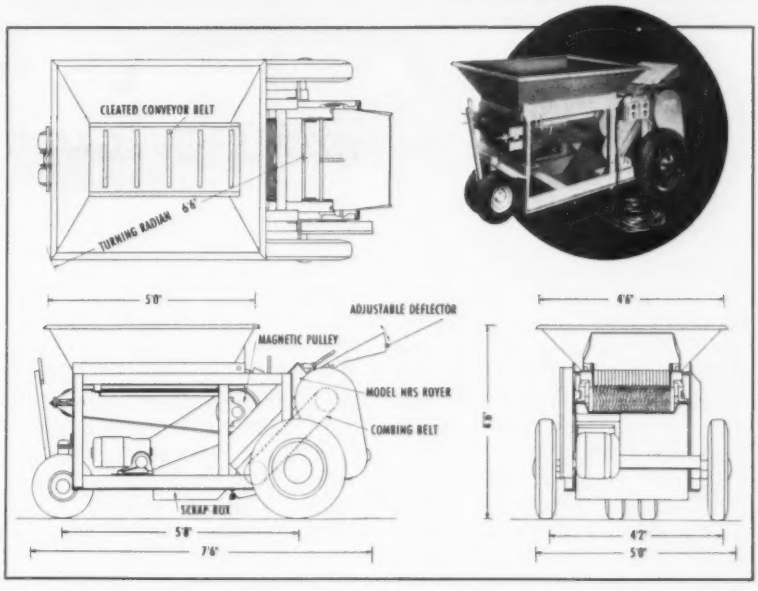
American Welding Society has issued a new publication, "New Welding Symbols," which contains many additions and improvements. New processes have been developed and new types of welds adopted which necessitated additional symbols to describe them adequately. Included among them are symbols for spot and seam welds made by arc welding; symbols for welds used in aircraft, guided missile and automotive work; and symbols for the types of welds used in structural steel fabrication, reinforced concrete work, etc.

The "Chart of Welding Symbols," has been redesigned to incorporate new developments. A new arrangement simplifies recognition of the symbols on the chart. The charts are prepared in two sizes, one for wall use, at $1.50, and a smaller replica listed at 50 cents for desk use. The booklet costs $3. Copies of booklet and charts may be obtained from Department T, American Welding Society, 33 West 39th St., New York 18.

SAND CONDITIONING TOPICS

PUBLISHED BY ROYER,
MANUFACTURERS OF THE FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER



Sand Conditioning costs can be reasonable

When any industry suffers a business recession, however slight, the attention of its leaders automatically shifts to cost cutting and the elimination of waste. Many foundrymen peer wistfully at the large, highly mechanized foundry and imagine semi-automation is the answer.

Looking at the foundry industry realistically, this form of advanced mechanization is not the answer. Seventy-two per cent of the nation's foundries employ less than 50 men—for most of these, advanced mechanization is both a physical and an economic impossibility.

For these foundries, units like the highly efficient Royer MAGNA-SAN are the practical solution to most sand conditioning cost problems. Here is a unit that is foundry-engineered to magnetically clean, mix, blend and aerate shakeout sand right on the molding floor—and at a lower initial cost and with less maintenance than any other mechanical method.

The Royer MAGNA-SAN is ideally designed for use in the small and medium sized foundry—this 73 per cent who most need the advantages of mechanization but cannot pick up the bill. Compare this compact unit, in the drawing above, with your available working space. Notice how the compact design permits easy maneuvering about crowded casting floors.

Capacity-wise, the Royer MAGNA-SAN conditions 45 tons of sand per hour—a full 8 per cent more than its closest competitor. And remember, it is a fact that economy of operation is determined by performance, which is measured by comparative expense per ton of sand conditioned.

We invite you to see for yourself how reasonable sand conditioning costs can be. Send the coupon and we'll rush your copy of the MAGNA-SAN Bulletin RM57 to you by return mail.

ROYER FOUNDRY & MACHINE CO.

ROYER 159 PRINGLE STREET KINGSTON, PENNA.

I want to know more about reasonable sand conditioning costs. Rush me your MAGNA-SAN Bulletin.

NAME_____

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All structural members of this swivel chair are aluminum alloy castings

CAST

Wider use of cast metal in furniture seen likely as result of its successful application to chairs furnished new Air Force Academy

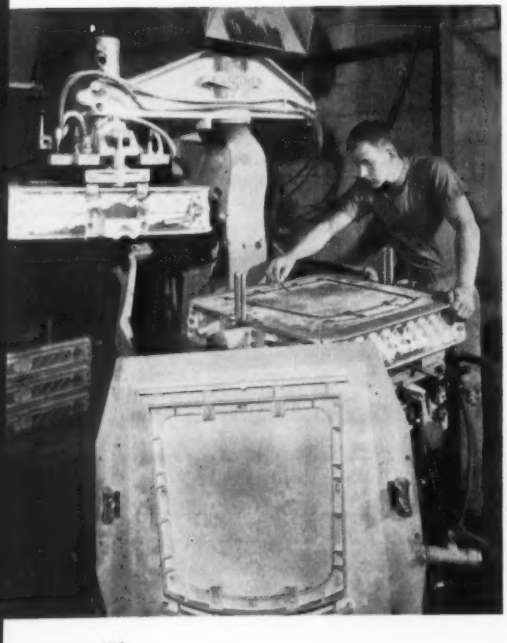
● A NEW NOTE in furniture design and manufacture is struck by the chairs supplied to the recently opened Air Force Academy near Colorado Springs, Colo. Structural members of the chairs are aluminum alloy castings, free of unsightly welds and joints.

The new Academy, situated on a 17,500-acre site in the Rocky Mountains, is designed ultimately to serve 12,000 people, including staff. Presently there are 1100 cadets and 160 military faculty members.

Designers for the Air Force Academy interiors and furniture are Walter Dorwin Teague Associates. The chairs were manufactured by the J. G. Furniture Co., Philadelphia, and the castings were made by the Littlestown Hardware & Foundry Co., Littlestown, Pa. The aluminum alloy employed for the castings is Tenzaloy, product of Federated Metals Div. of American Smelting & Refining Co.

Fifty-Year Life—Four basic requirements guided the furniture designers — economy, standardization, compatibility with exterior achitecture, and at least a 50-year life for all equipment from the standpoints of durability and appearance. Wrought aluminum originally was specified, but the designers disliked the necessity of using welded joints —which often leave some discoloration — or some type of fasteners, which interrupt the smooth visual line essential to modern design. Moreover, cast frames will support far more weight than those of

Matchplate in foreground is used to make mold for chair seat casting. Mold is shown on machine



Shakeout operator removes casting of swivel chair seat from the sand. Castings were produced by Littlestown Hardware & Foundry Co., Littlestown, Pa. Good appearance and strength dictated use of castings

ALUMINUM CHAIRS

similar design executed in conventional aluminum extrusions. Hence the decision to adopt cast metal.

Some problems were encountered in developing a casting method which would meet the specified shapes, dimensions, and surface finish. Special gating and arrangement of chills for the sand molds were devised, however, and successfully eliminated surface imperfections. Finishing of the castings included polishing and anodizing. As will be noted from the accompanying illustrations of the chair seat casting, a fairly sizable mold was required to accommodate this part despite its relatively thin section.

A feature of the chair's design is the ability to disassemble the metal members quickly when upholstery replacement is necessary. Cushions are of foam rubber covered with Air Force blue vinyl.

Littlestown Hardware & Foundry Co., producer of the castings, was established in 1916 as an iron foundry. Although it still makes gray iron castings, it has been casting aluminum since 1946. In addition to its foundry jobbing business, Littlestown produces castings for its line of awning and small boat hardware and other manufactured products.

First Application—This is said to be the first successful wide-scale application of aluminum alloy castings to furniture, but increased use in the future appears in prospect. For instance, the J. G. Furniture Co., which is one of the country's leading makers of office and institutional furniture, plans to introduce additional furniture of this type.

According to Morris Goldman, J. G. Furniture vice president, cast aluminum offers unlimited design possibilities because it is ideal for the trend in contemporary furniture which employs both angular lines and soft, sweeping curves. In addition, its strength permits the use of thinner members, if desired, than would be required with conventional furniture material.

With mass production, the inherent economies in the casting operation more than offset the initial investment in patterns. As a result, the finished chair is reported to be competitive in price with furniture of comparable design made of any other material.

Finishing the base of the swivel chair. All castings were ground and then anodized

Now Hear This!

Photo from Cypress Gardens, Florida

Smith L-O Core Oil is First Choice in America's Foremost Foundries

When it comes to making accurate cores, the first consideration is an oil that is "ready to go" with the kind of sand and type of casting to be made. It is for this reason that many of America's foremost foundries order and re-order Smith L-O. These companies know there is a grade that blends perfectly with their conditions . . . many know — through happy experience — that a Smith Foundry Service Man was responsible for the selection of such a proper grade. If you need assistance, plus a core oil of guaranteed uniformity — look first to Smith L-O . . . the name that stands for a service as well as a product.

Smith L-O Core Oil
ROD DIP LIQUID PARTING
SMITH OIL & REFINING CO.
INDUSTRIAL OILS DIVISION • ROCKFORD, ILLINOIS

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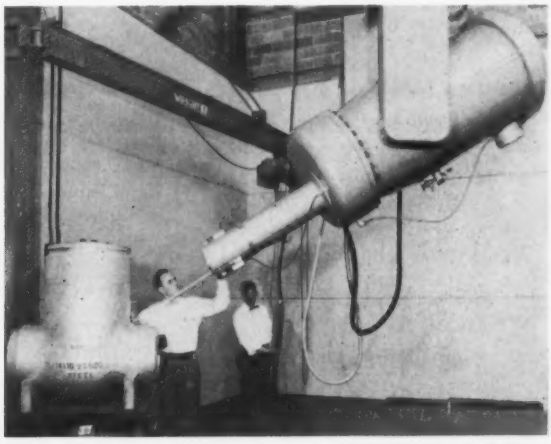
- ST. LOUIS COKE & FOUNDRY SUPPLY CO. St. Louis, Missouri
- BRUCE-CONREAUX CO. INC. Indianapolis 7, Indiana
- WESTERN INDUSTRIAL SUPPLY CO. Portland 14, Oregon
- MALCOLM G. STEVENS Arlington, Massachusetts
- OVERSEAS COMMODITIES, LTD. Vancouver, B.C., Canada

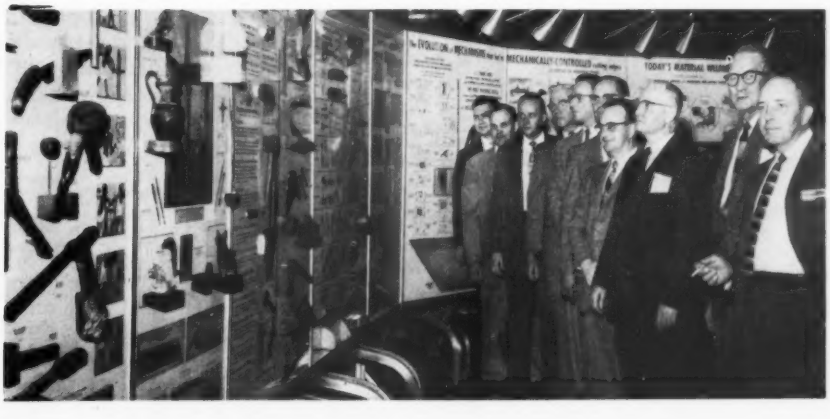
News Views

CUTTING CAR WEIGHT: Charles Kiskaddon Jr., Aluminum Co. of America, holds a 23-lb aluminum transmission case for a 1959 Ford. The permanent mold casting saves an estimated 60 lb in the total weight of the car



NONDESTRUCTIVE TESTING: A 2-million volt radiographic x-ray generator and a 10-curie source of Cobalt 60 have been added to nondestructive testing facilities at the Steel Casting and R-P&C Divs., American Chain & Cable Co., Reading, Pa. In this view, a casting is being readied for examination with the x-ray unit

KENNEDY SCHOLARSHIP: Assistant Dean Rupert M. Price, University of Illinois, Navy Pier Branch, presents Thomas R. Hoogervorst with the Robert E. Kennedy Scholarship Award as Robert P. Schauss, chairman of the Kennedy Scholarship Committee, AFS Chicago Chapter, watches. Photograph is by N. A. Baranov, Beardley & Piper Div.



LOTS OF CHIPS: U. S. industry produces 15 million tons of chips annually, audiences are told at the DoAll Co.'s traveling educational presentation, "The Cutting Edge." The company's third such program, it shows the importance of cutting tools to our economy

Literature for Foundrymen

Diecasting Machine

Folder features a cutaway drawing portraying special features and presents specifications and general data on the company's diecasting machine. — **Cuyahoga Industries,** 17920 Waterloo Rd., Cleveland 19, Ohio.

For More Details Circle No. 467—Page 53

Oscillating Conveyors

Book 2744 presents data on oscillating conveyors with material handling capacities of 25 to 350 tons per hour. Product information on trough widths, depths, section lengths, accessories, and selection and application data are included.—**Link-Belt Co.,** Dept. PR, Prudential Plaza, Chicago 1, Ill.

For More Details Circle No. 468—Page 53

Shot Blast Liners

Bulletin 958 on liners for shot blast machines features a series of schematic illustrations of standard wheel housings with breakdown drawings of individual parts.—**Latrobe Steel Co.,** Latrobe, Pa.

For More Details Circle No. 469—Page 53

Vibrators

Catalog 58 illustrates and presents engineering data on pneumatic vibrators for industrial uses. —**Cannon Vibrator Co.,** 1111 Power Ave., Cleveland 14, Ohio.

For More Details Circle No. 470—Page 53

Molybdenum in Steel

A 36-page booklet on the role of molybdenum in heat-treated low-alloy steel castings discusses hardenability, tensile properties, fatigue, hardness, wear and impact resistance, machinability, and weldability. Tables, graphs, and charts substantiate and clarify the text.—**Climax Molybdenum Co.,** 500 Fifth Ave., New York 36, N. Y.

For More Details Circle No. 471—Page 53

Hydraulic Cylinder Data

Catalog sheet "Aids for Preventing Excessive Bearing Wear and Column Failures" provides the answers to commonly encountered problems relating to the column strength of hydraulic cylinder piston rods.—**Miller Fluid Power Div., Flick-Reedy Corp.,** 2040 N. Hawthorne Ave., Melrose Park, Ill.

For More Details Circle No. 472—Page 53

Cupola Blowers

Rotary positive displacement and centrifugal blowers are described in Bulletin FC-158. Selection tables and performance data for both types and data on the use of air-weight controls are included.—**Roots-Connersville Blower,** a division of **Dresser Industries Inc.,** 900 W. Mount St., Connersville, Ind.

For More Details Circle No. 473—Page 53

Barrel Finishing

Tumbling media, types of applications, types and functions of tumbling barrels, fixturing and linings for tumbling barrels, compounds and cleansers, dos and don'ts on the use of water, and analyses of typical tumbling jobs are covered in Form A-1503.—**Carborundum Co., Electro Minerals Div.,** Niagara Falls, N. Y.

For More Details Circle No. 474—Page 53

Beryllium Copper

Analyses, properties, and recommended foundry handling techniques, including heat treatment data, for beryllium copper casting alloys are given in folder.—**Brush Beryllium Co.,** 4301 Perkins Ave., Cleveland 3, Ohio.

For More Details Circle No. 475—Page 53

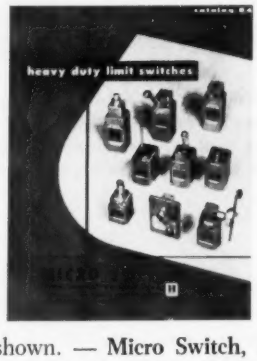
Ferromanganese-Silicon

Folder describes savings in manganese costs for stainless steel resulting from the use of ferromanganese-silicon. The folder shows effect of the alloy on slag reduction and steel cleanliness and lists analysis and sizes.—**Electro Metallurgical Co.,** a division of **Union Carbide Corp.,** 30 E. 42nd St., New York 17, N. Y.

For More Details Circle No. 476—Page 53

Limit Switches

Catalog 84 covers heavy-duty limit switches. It lists switches with a variety of contact arrangements, for either direct or alternating-current applications. Several actuator designs in each switch type are shown. — **Micro Switch,** a division of **Minneapolis - Honeywell Regulator Co.,** Freeport, Ill.



For More Details Circle No. 477—Page 53

Rollover Draw Machines

Bulletin 5115 covers rollover draw and jolt rollover draw machines in pneumatic models with capacities of 600 to 3000 lb and hydraulic models with capacities from 4000 to 15,000 lb.—**Beardsley & Piper,** a division of **Pettibone Mulliken Corp.,** 2424 N. Cicero Ave., Chicago 39, Ill.

For More Details Circle No. 478—Page 53

Material Handling

"The Basic Concepts of Industrial Material Handling" is the title of new, revised Booklet No. 1, which is part of "The Library of Know-How" published by the **Material**

ANNOUNCING:

THE NEWEST SOURCE OF QUALITY ELECTRIC ARC FURNACE STEEL SHOT AND STEEL GRIT IN THE INDUSTRY

Our completely new plant is designed and engineered to give you the fastest delivery on Quality Electric Steel Shot and Grit. You can now secure the quality you require and get the service you want from the most advanced electric steel shot and grit source in the industry. Our all new plant in the heart of the steel producing center of the world is the result of years of planning by specialists to provide a new facility for the highest quality shot and grit obtainable.

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Distributorships Available

Circle 624 on Page 53

Handling Institute Inc., Suite 759, One Gateway Center, Pittsburgh 22, Pa.

For More Details Circle No. 479—Page 53

Tramrails

Application Booklet 2008-N contains detailed studies of track design, peening, and stresses and describes types of carriers, cranes, tractors, track switches, buckets, grabs, and electrification. — **Cleveland Tramrail Div., Cleveland Crane & Engineering Co.**, 1036 E. 289th St., Wickliffe, Ohio.

For More Details Circle No. 480—Page 53

Iron Foundry Alloys

"Vancoram Iron Foundry Alloys" details composition, uses, and advantages of 31 ferroalloys and four briqueted alloys for cupola and electric furnace foundry irons. —**Vanadium Corp. of America**, 420 Lexington Ave., New York 17, N. Y.

For More Details Circle No. 481—Page 53

Surface Heating

Technical data, including tables, on how to select equipment and controls for metal surface heating are contained in Bulletin GEA-6146B. — **General Electric Co.**, Schenectady 5, N. Y.

For More Details Circle No. 482—Page 53

Sprue Former

Information sheet gives sizes and cost of rubber down sprue formers for use in green sand molding.— **Keson Industries**, Box 11, Berwyn, Ill.

For More Details Circle No. 483—Page 53

Silicones

The "1959 Guide to Dow Corning Silicones" includes descriptions of pattern release agents for investment casting and shell molding foundries and heat-stable grease and oil for lubricating moving parts exposed to high temperatures. —**Dow Corning Corp.**, Midland, Mich.

For More Details Circle No. 484—Page 53

Pressure Gages

Design and construction improvements have been made in these company gages which employ the Bourdon tube gage principle. The gages are for use on turbines, engines, blowers, locomotives, hydraulic presses, tractors, pumps, compressors, and other applications

What's the result when foundry experts design facilities for their own company? That's the case at Link-Belt's new Ewart Foundry at Indianapolis. Inside and out, it employs the very latest in machines and methods . . . ideas that could well lead to reduced costs in your foundry. Here's an illustrated tour of this . . .

MODEL OF MECHANIZATION

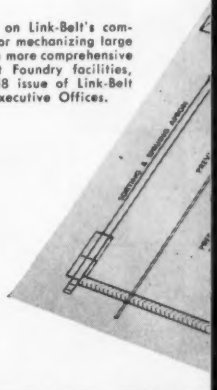
WHAT's your conception of the "ideal" foundry? Highly mechanized, highly flexible? Clean, safe, orderly? An on-the-button description of Link-Belt's new Ewart facility —proud product of the Company's own foundry specialists, and equipped throughout with Link-Belt conveying, elevating and preparation equipment.

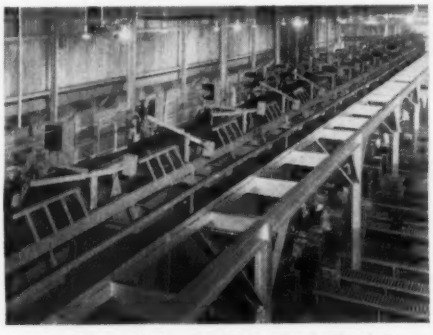
Ewart's efficiency is all the more notable for the *variety* of work involved. Production ranges from small pearlitic chain links to large-diameter malleable sprockets. In addition, the foundry can handle molds for special work, small jobs or large production runs.

The wealth of new ideas born in this installation are now available to the entire industry . . . can be duplicated in your foundry through a program of step-by-step modernization. For specifics, call your Link-Belt office.

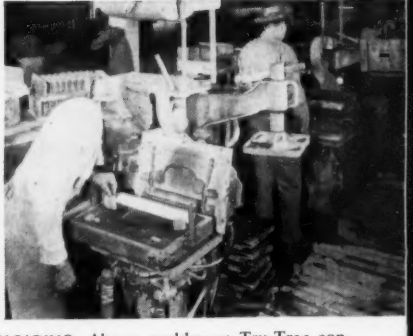
STORAGE AND CHARGING YARD is completely covered by steel frame building and served by ten-ton overhead crane. Link-Belt Pre-Bilt belt conveyor returns sprue from tumbling mills back into charging area.

Book 2423 gives details on Link-Belt's complete line of equipment for mechanizing large and small foundries. For a more comprehensive description of the Ewart Foundry facilities, send for the August 1958 issue of Link-Belt News. Write Link-Belt Executive Offices.



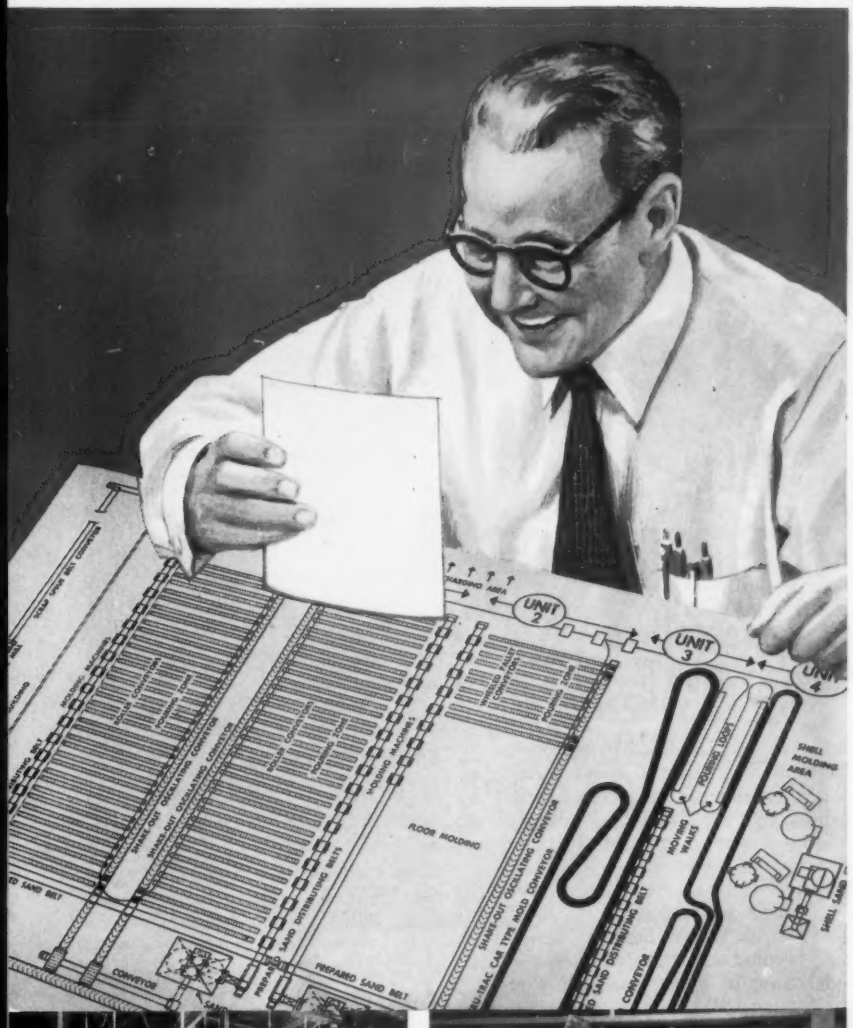


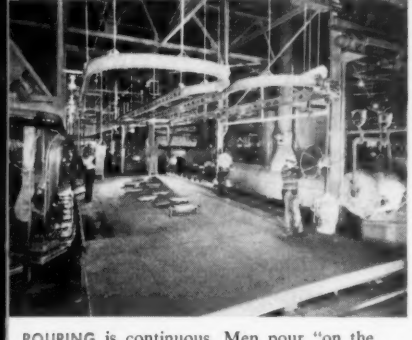
SAND HANDLING. Link-Belt distributing belt conveyor serves 18 molders. Through a unique timing system, plows are operated automatically to keep molder supplied with sand regardless of his hourly requirements.



MOLDING. Above, molder on Tru-Trac continuous conveyor sets cores. To save molders' time, hopper gates are air-operated by knee valve, core racks are kept filled, molds are carried by conveyor to pouring zone.

SORTING and spruing take place on this Link-Belt No-Leak steel apron conveyor. Sand, meanwhile, is carried by two heavy-duty Torqmount oscillating conveyors and a bucket elevator to reclamation and storage.





POURING is continuous. Men pour "on the move," standing on platform conveyor which travels at same speed as mold-carrying conveyor. At left is trolley conveyor on which shell mold castings are poured.

SHAKEOUT. After cooling, molds and castings are discharged onto Link-Belt oscillating conveyor under the floor. It, in turn, discharges to vibrating shakeout screen that separates sand from castings.

LINK-BELT

CONVEYORS AND PREPARATION EQUIPMENT

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants and Sales Offices in All Principal Cities. Export Office, New York 7; Australia, Marrickville (Sydney); Brazil, Sao Paulo; Canada, Scarboro (Toronto 13); South Africa, Springs. Representatives Throughout the World. 15,016

where the gage may be subjected to violent pressure pulsations or severe mechanical vibrations. — **Helicoid Gage Div., American Chain & Cable Co.**, Bridgeport 2, Conn.

For More Details Circle No. 485—Page 53

Pattern Letters

Catalog presents full line of alloy aluminum and white metal letters and numerals for patterns and other uses. A price list is enclosed.— **H. P. Maughlin Co.**, 953 Ingleside Ave., Columbus 8, Ohio.

For More Details Circle No. 486—Page 53

Precision Finishing

Suggestions for ways to improve and expand barrel finishing and wet blasting processes are presented in the second issue of "Techline Finishing Progress." Other stories describe experience of several companies with wet blasting equipment. The company's laboratory for test finishing also is described.—**Techline Div., Wheelabrator Corp.**, 1102 Avenue V, Vicksburg, Mich.

For More Details Circle No. 487—Page 53

Storage and Conveyor Units

Bulletin 207 covers square, round, vertical, and horizontal storage equipment as well as negative and positive pneumatic conveying systems, rotary valves, bucket elevators, feeders, screw conveyors, and bulk trucks.—**Sprout, Waldron & Co.**, 130 Logan St., Muncy, Pa.

For More Details Circle No. 488—Page 53

V-Belt Drives

Catalog IP-1577 tells how to select and install V-belts, how to detect V-belt trouble, diagnose belt failures, and correct drive troubles. Tips are given for V-belt maintenance.—**B. F. Goodrich Industrial Products Co.**, Akron, Ohio.

For More Details Circle No. 489—Page 53

Anchors and Hangers

Anchor assemblies for castable, plastic, and combination specialty and firebrick walls are described in Bulletin 725.—**J. H. France Refractories Co.**, 1944 France Rd., Snow Shoe, Pa.

For More Details Circle No. 490—Page 53

Study Courses

Illustrated catalog describes 17 home-study courses for the metals

say "when"!

with MARSHALL ENCLOSED-TIP THERMOCOUPLES

. . . for strong, dense, uniform castings from every melt!

Reduce scrap rejects, misruns, cold-shuts . . . achieve consistently high quality castings! Marshall Enclosed-Tip Thermocouples indicate instantly and accurately "when" to pour brass, bronze, aluminum, or magnesium melts. Frequent, regular, exact temperature readings help avoid shrinkage porosity, gas porosity, dross . . . produce better casting finishes . . . control aluminum grain size.

Dependable, easy-to-use Marshall Thermocouples *take interior temperatures deep within the melt.* Tip can be stirred to speed reading, giving *true temperature in about 20 seconds.* Pyrometer always indicates *steady, accurate reading.* Thermocouple wire can't become contaminated from melt or short-circuited by slag. Tip withstands scores of immersions before replacement is necessary. Mail coupon for catalog today!

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Furnace Type (above) . . . lengths up to 10 ft., for use with Stationary Pyrometer.
Ladle Type (left) . . . for use with Portable Pyrometer.

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Please rush Catalog which fully describes Marshall Enclosed-Tip Thermocouples!

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industry.—**Metals Engineering Institute,** a division of **American Society for Metals,** Dept. HL, 7301 Euclid Ave., Cleveland 3, Ohio.

For More Details Circle No. 491—Page 53

Ductile Irons

Booklet "Engineering Properties of Ni-Resist Ductile Irons" presents the subject matter indicated by its title. Tables and graphs explain mechanical and physical properties, erosion and corrosion resistance, and high-temperature strength.—**International Nickel Co.,** Reader Service Dept., 67 Wall St., New York 5, N. Y.

For More Details Circle No. 492—Page 53

For the Patternmaker

Fully indexed, 112-page Catalog R presents the company's full line of equipment and supplies for use in pattern shops. — **Kindt-Collins Co.,** 12651 Elmwood Ave., Cleveland 11, Ohio.

For More Details Circle No. 493—Page 53

Electric Vibrators

Catalog presents descriptions, data, and specifications for 14 standard electromagnetic vibrators for bins, hoppers, and chutes.—**Syntron Co.,** 540 Lexington Ave., Homer City, Pa.

For More Details Circle No. 494—Page 53

Conveyor Belts

A line of heavy industrial Koroseal conveyor belts for applications such as those involving contact with cutting oils and greases in metalworking plants is described in Data Sheet 2470.—**B. F. Goodrich Co.,** Akron, Ohio.

For More Details Circle No. 495—Page 53

Vacuum Furnace

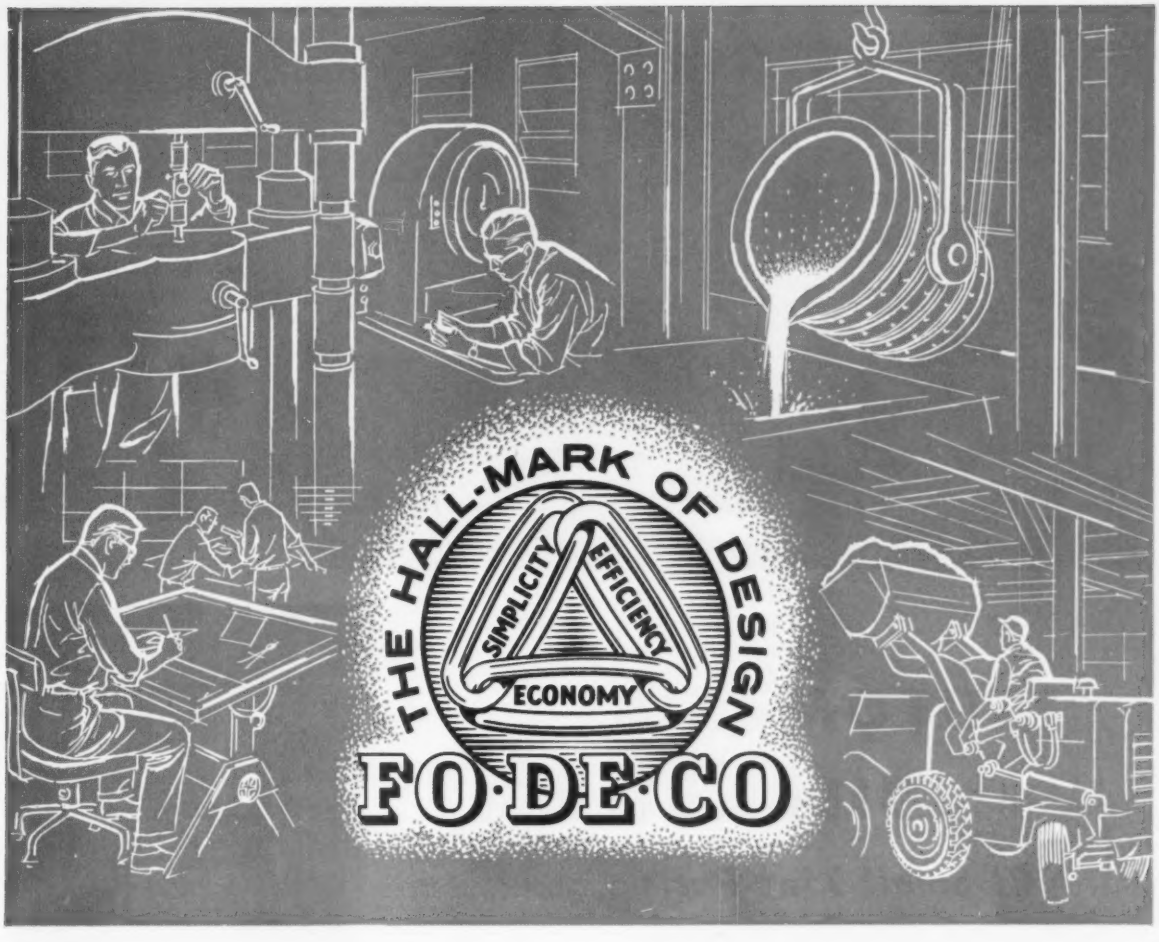
Features, specifications, and operating requirements of a 12-lb, tilt-pour vacuum induction furnace are presented in technical data sheet.—**NRC Equipment Corp.,** 160 Charlemont St., Newton 61, Mass.

For More Details Circle No. 496—Page 53

Thawing Bulk Material

Bulletin 168 covers infrared heating equipment for thawing frozen bulk material in railroad cars.—**Hewitt-Robins Inc.,** 666 Glenbrook Rd., Stamford, Conn.

For More Details Circle No. 497—Page 53



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EXPERIENCE and KNOWLEDGE are ESSENTIAL in a business of this type, particularly when new construction, modernization or expansion is planned.

FODECO's staff has been built to serve the foundry industry in ALL of its functions. Our programs are engineered by men who know foundries. We can help you with:

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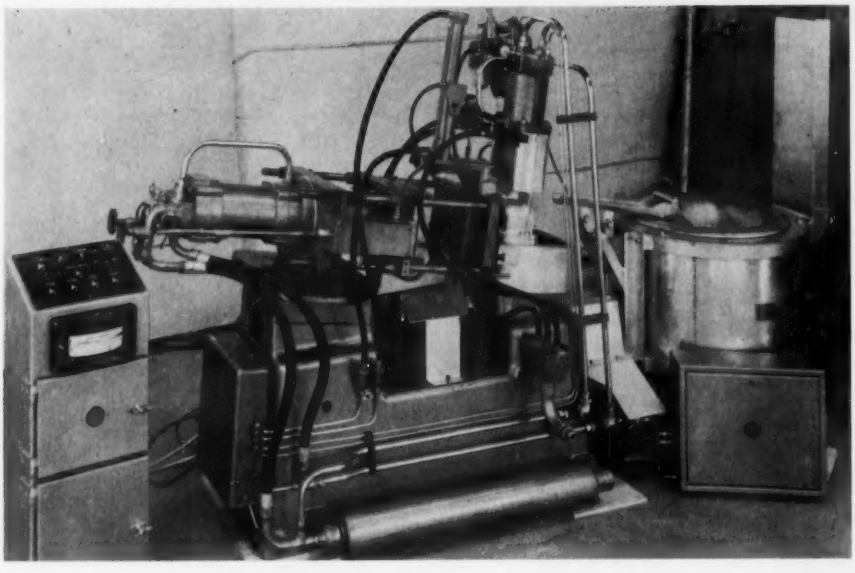
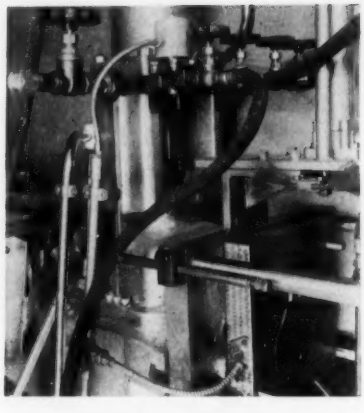


Left—Over-all view of a fully automatic machine for diecasting of small parts shows the control cabinet, diecasting unit itself, and the melting furnace. View below is closeup which shows the brush to clean the die



AUTOMATIC DIECASTING

Of Small Zinc Parts

By IRWIN LUBALIN
General Manager
Die Casting Machine Tools Ltd.
Port Washington, N. Y.

● AUTOMATIC diecasting machines which produce zinc castings weighing up to ½ oz have been operated successfully for many years. It was believed for a long time, however, that larger castings of "hardware quality" could not be produced successfully in this manner. Now, such a machine has been made. The purpose of this article is to describe the considerations which affected its design.

Operations Analyzed—The first step required was an analysis of the various operations performed by a diecasting machine operator. It had to be determined whether or not they could be automated economically so that one operator could take care of a bank of machines and at the same time perform supplementary operations.

Normally, the operator inaugurates the machine operating cycle, which causes the dies to lock up. If dies are not locked completely and the plunger does not come down, the operator opens the dies and checks for excessive flash or dirt, cleans it out, and resumes the cycle. Automatic timers hold the plunger down a predetermined time. On completion of the plunger squeeze, the plunger comes up. An automatic timer takes over the solidification dwell and allows adequate time for the casting to harden enough to be ejected. When this timer has finished its work, the die opens and the part is ejected.

It then is the operator's duty to check the gate of castings, examine them for visual flaws, and place the gate in a tote box or conveyor. Next, he lubricates the die, cleans it of excessive specks of flash, and makes any necessary adjustments in water cooling or metal temperature. At this stage he is ready to start the next cycle.

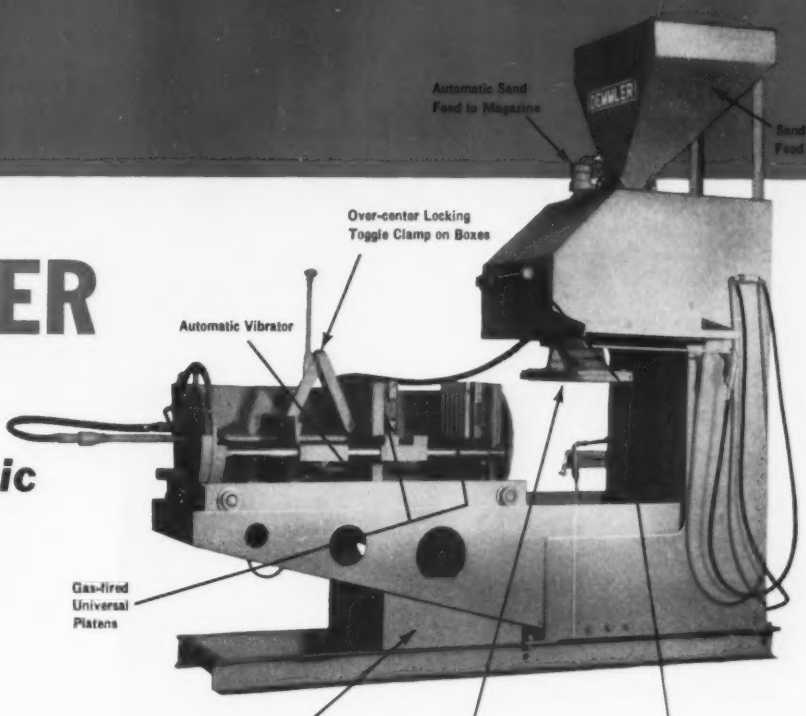
In addition, it is necessary for him to bring a new supply of molten metal to the machine pot from time to time when it needs replenishment.

A machine capable of performing all these operations also must be able to do so continuously. Therefore, it must be built so that it will run under arduous conditions day in and day out. Such a machine is subject to wear and erosion on parts common to all diecasting machines, but at high cycling speeds the machine goes through many more motions per day. Thus, wear tends to accelerate, and design of the machine must provide for rapid and easy maintenance.

Since the diecasting process is complex enough, it is preferable to avoid multiple-cavity dies, which are

NOW—a low cost true shell core blower of rugged Demmler quality for only $1995.00... shipping wt. 1500 lbs.

Typical cores suitable for production on the "Utility" shell core blower.


Automatic Sand Feed to Magazine
Sand Mix Feed Hopper
Over-center Locking Toggle Clamp on Boxes
Automatic Vibrator
Gas-fired Universal Platens
Screened Drain-Back Hopper
Field-proven Demmler Blow System
Master Control Valve with Safety Interceptors

DEMMLER

"Utility"

Semi-Automatic

Shell Core Blowers

OPERATING FEATURES:

1. Sand fed automatically from feed hopper into blow magazine. Hopper can be replenished without stopping production.
2. Over-center toggle lock for positive box closing and opening.
3. Master control lever shuttles box under blow head, clamps it, blows, unclamps and shuttles box to rollover drain position.
4. Rollover designed so that weight of boxes remain within the radius of rotation . . . no out of balance weight to struggle with.
5. Vibration applied to boxes automatically in rolled-over drain position for consistency of core wall thickness.

MODEL # 121015—VRD

Max. Box Size	12"x 10" x 15" Deep
Max. Core Weight, before draining	20 lbs.
Sand Feed Hopper Capacity	250 lbs.
Price, FOB Kewanee, Illinois	*$1995.00

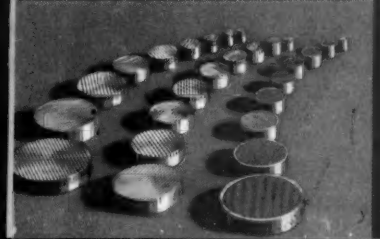
*Price includes quality blow-off gun and spray gun.

MODEL # 242030—VRD

Max. Box Size	24" x 20" x 30" Deep
Max. Core Weight, before draining	80 lbs.
Sand Feed Hopper Capacity	1000 lbs.
Price, FOB Kewanee, Illinois	*$4990.00

*Price includes quality blow-off gun and spray gun.

DEMMLER MANUFACTURING COMPANY • KEWANEE, ILLINOIS



PRECISION CORE BOX VENTS

Demmler is by-far your best source for precision core box vents, manufactured by specialists who pioneered in the core blower industry. Many sizes, slot widths and screen meshes are available in brass and steel core box vents.

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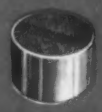


HL 150 MESH VENTS

A new general purpose vent which practically eliminates the cleaning coarser screens demand. Write for literature on Demmler vents.

more troublesome, obviously, than single cavities. To compensate for the lack of productivity derived from multiple cavities, it is necessary for the machine to operate at high rates of speed.

High-speed operation requires a modification in die design because water cooling becomes extremely critical. It is necessary to use large water jackets and good-sized water lines designed to cool the die in spite of the rapid, continuous injection of molten metal. Adequate waterways must solidify the casting rapidly enough so that it can withstand the shock of ejection. At the same time, these waterways may not chill any portion of the surface of the casting which might detract from the finish.

It is of utmost importance to appreciate the fact that an automatic diecasting machine is useless unless the die is designed in relationship to the machine. Once the die has been designed and built, it is necessary to consider the specific design characteristics of the machine itself.

Automatic Cycling — The electronic part of the machine, which controls the automatic cycling, should be placed in a separate cabinet to keep it away from heat, sprayed lubricants, vibration, and ejection shocks to which a diecasting machine is subject. A set of manual controls is needed to test new dies, to set dies, and to inaugurate the cycle.

It also is necessary to incorporate a set of semiautomatic controls which will take a machine through a complete time cycle and stop. Conventional machines operate in this manner when the machine is being warmed up, until initial adjustments are made to suit the requirements of a particular job. At this stage the fully automatic controls are turned on and the machine continues to run by itself.

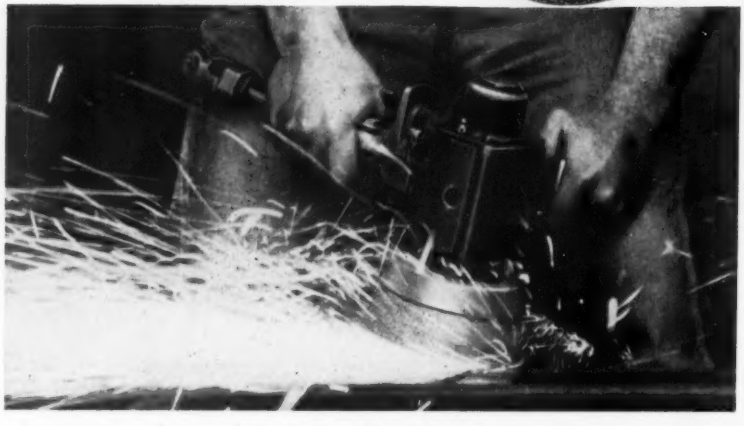
Safety—In addition to the conventional safety interlock to prevent injection with a die opened or with the toggles not completely overthrown, a control mechanism is needed to make the die open before it is harmed in the event that a casting is not ejected. An extremely sensitive flash or dirt-sensing device also must be utilized so that the machine will not try to lock up and iniect with an excessive amount of flash on the die surface.

Cleaning—A primary function of the operator is to clean flash or debris from the face of the die. On an automatic machine, this job can be done during the ejection stroke by a brush mechanism—a completely adjustable set of phosphor bronze brushes which will not wear or damage the die, but is sufficiently rigid to remove all flash from the die faces.

These brushes are made up in segmented units which can be set up on either die to brush either die space at varying depths. If the flash-sensing microswitches feel an excessive amount of flash, the die immediately opens and is rebrushed. Brushing may be performed two or three times before the dies lock up properly.

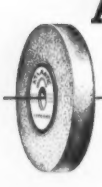
Lubrication—Lubrication of the die after it has been cleaned can be taken over by a pair of nozzles bearing on the cover and ejector half. These nozzles are attached to a device which meters a specific amount of die lubricant for each

ATLANTIC WHEELS
float through the roughest jobs . . .



Even on the toughest flash and weld removal operations, you can depend on Atlantic Grinding Wheels for fast, cool, clean-cutting action. Made with a special resinoid bond to withstand high centrifugal forces and assure maximum safety, they have a smooth, floating action that calls for less pressure on the grinding surface . . . helps reduce operator fatigue and increase efficiency.

If you have any type of metal removal or smoothing problem, it will pay you to give Atlantic Grinding Wheels a trial run. An Atlantic representative will be glad to recommend the right wheel for your specific requirements. Write for details and a copy of the Atlantic Grinding Wheel Catalog. Atlantic Abrasive Corp., 534 Pearl Street, So. Braintree, Mass.



Atlantic Abrasive Corp.
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South Braintree 85, Massachusetts

STRAIGHT WHEELS • CYLINDER WHEELS • CUP WHEELS
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One of a series on:

why practical foundrymen select Simpson MIX-MULLER by four to one

American Abrasives Metal Co.,
Irvington, N. J.,
saved $2500 in bond alone during first year operating their 2F Mix-Muller.

Studebaker-Packard Corp.
Manifold line
—Sand output tripled: sand quality improved . . . moisture control improved . . . since installation of 2½F Mix-Muller. Is one of 13 Mix-Mullers used at South Bend, Ind. Foundry.

"Use of bond in system has been cut by 50% with no loss in quality."
Superior Foundry Company
Cleveland, Ohio

". . . our mulling cycle has been cut by 30% due to increased capacity and reduced mulling time. Facing has been eliminated."
Xenia Foundry & Machine Co.
Xenia, Ohio

How Simpson mulling principle can save you up to 50% in bond cost

When a batch of sand and bond is mulled the sand will achieve *most* of its green strength early in the process . . . But, *most* isn't always good enough to do all jobs. Scrap, inferior castings, wasted time, money and material are poor reward for a half mulled batch of foundry sand—when the total savings in mulling time may be less than a minute.

There is another way to save mulling time . . . *use a great deal more bond*. You'll get your strength but it will still be earned at the expense of questionable sand quality . . . and bond is costly.

Some foundrymen make a choice—time or bond, but many more *get both* by doing one of two things:

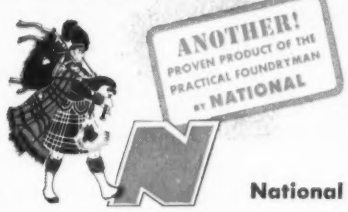
(1) Changing to Simpson Mix-Muller
(2) Using their present Mix-Muller wisely

These *practical* foundrymen know from experience, that they may mull a batch a little longer in a Simpson but they also know that, model for model, the Mix-Muller can turn out more, better sand in a given time than any other sand mixer!

SIX WAYS YOU SAVE WITH MIX-MULLER

Yes, you can save on bond with the Mix-Muller

. . . up to 50% as reported by users—but you'll save in six other ways too. Combined, these savings mean much more to practical foundrymen than a few seconds saved in mulling. They are the reason why, for almost 50 years, Simpson Mix-Muller has been the choice of *practical* foundrymen by four to one over any other means of sand preparation.



GET MORE FOR YOUR EQUIPMENT DOLLAR WITH MIX-MULLER

Model for model, you'll mix more sand—get more tonnage per hour with large capacity Mix-Muller.

SAVE RAW MATERIALS WITH MIX-MULLER

Only *true* mulling permits you to use lean mixtures. You'll make the most of *less* oil, binder and other additives—and get top quality sand at the same time.

YOU SAVE SCRAP WITH MIX-MULLER

True mulled sand cuts down on casting, mold and core scrap.

YOU SAVE CLEANING COSTS WITH MIX-MULLER

Uniformly coated sand means better finish—right from the mold with less cleaning.

YOU SAVE POWER WITH MIX-MULLER

Mix-Muller takes only about ½ the power of other machines—to do the same or a better job. Only power required is used to plow and to roll mullers over the sand.

YOU SAVE MAINTENANCE WITH MIX-MULLER

Simple, rugged construction makes Mix-Muller easy to operate, maintain—and get parts for. Low speed mulling insures longer wear and part life to save you materials and man hours.

F-758

National Engineering Company, 646 Machinery Hall Bldg., Chicago 6, Ill.

Circle 630 on Page 53

shot. It is blown onto the die faces by the exhaust stroke of the brush-operating air cylinder.

Water—One of the functions of an operator is to check his castings and to make necessary water cooling adjustments. This job can be handled by a thermostatically controlled, solenoid-operated water valve which automatically turns the water on or off.

Metal Temperature—At a fully automatic, high-speed cycle, metal temperature becomes critical. To obtain rapid solidification, metal must be run at the lowest possible temperature which will permit it to fill the cavity adequately and prevent formation of nozzle freeze-ups. It therefore is necessary to provide a control to hold metal temperature within ± 5° F.

Metal Supply—The operator or a helper must bring molten metal to the machine pot from time to time. This task is done automatically by a ladling device which operates from a pair of probes of different lengths. When the metal level drops below the lower probe, it breaks a circuit. A relay is de-energized and activates a solenoid. It operates an air cylinder which elevates the automatic ladle in the preheat pot and causes sufficient metal to flow into the pot to reach the level of the top probe. As soon as this level is reached, the action of the ladle is reversed, and it returns to its position in the pot. The ladle has to be heat and corrosion resistant to prevent metal contamination and excessive erosion in the holding furnace.

Pick Off—This function of the operator cannot be performed readily by a mechanism. Its requirements vary from one job to the other depending on the placement of core pulls, ejector pins, etc. It is important to insure that the castings and the gating system are designed to be rigid enough to prevent distortion in dropping. Bosses or guards incorporated in the gating system prevent any of the platable faces of the casting from being scarred. A short drop into a chute on which castings slide into a tote box or onto a conveyor permits a solution to the problem.

Die Changeover—The machine not only must replace the various functions of an operator, but also must be capable, especially in a job

Are shell mold all pretty much

"No!" say men in two big foundries. They've poured millions of shell mold castings

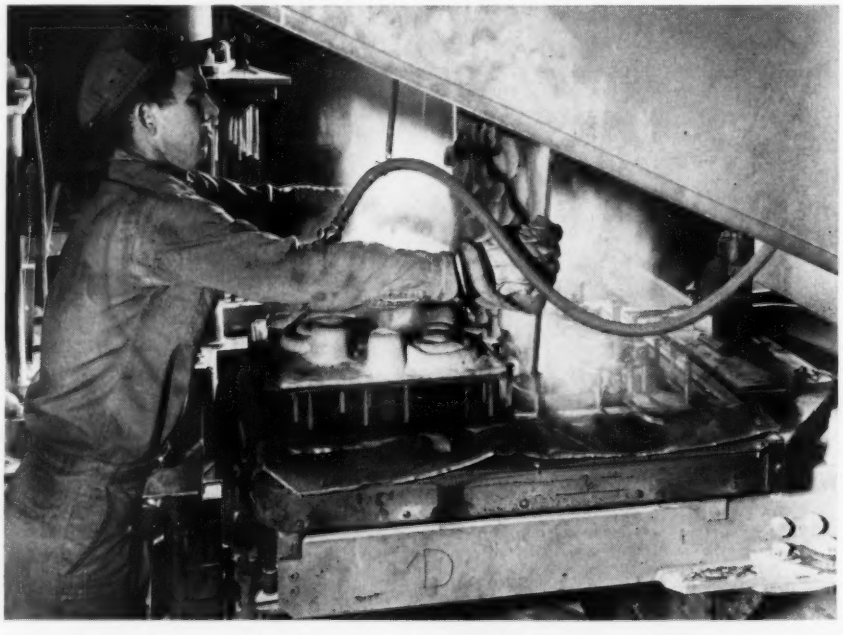
Here's how they feel about resins

Talk to the men at Dayton Malleable Iron Company—one of the country's biggest independent foundry firms—and you find strong conviction on foundry resins.

You also find one brand of resin mentioned more than any other.

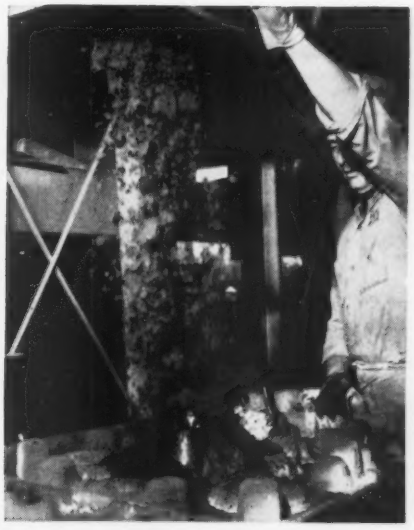
That one is Durez.

"If there were a better resin made, we'd be using it," says B. D. Claffey,



SHELL MOLDS at Dayton Malleable's G.H.R. Foundry Division eliminate shift between cope and drag, minimize machine stock requirements, and often reduce machining time. Shell cores can be held close to size and give clean, smooth surfaces. No core driers are needed, and warpage is less a problem than ever before. On one difficult core job, a switch from oil sand to shell reduced scrap more than 50%.

resins alike?



DAYTON'S IRONTON MALLEABLE DIVISION uses shell for close tolerances, low metal weight, smooth finish on pearlitic malleable transmission parts. Day-in, day-out uniformity of Durez resin helps keep production rates high.

general manager of Dayton's huge G.H.R. Foundry Division at Dayton, Ohio. G.H.R. uses Durez resin for molds and cores in making light and medium weight gray iron castings for autos, refrigerators, and other appliances.

"Same results every time"

"We find Durez resins are the easiest to control," continues Mr. Claffey. "We get the same results every time with them." This uniformity can make the difference between profit and loss on many jobs.

"We also like the service we get from Durez sales engineers," Mr. Claffey concludes. "They talk our language, and have helped us over some rough spots."

"Less peel"

Over at Ironton, Ohio, L. J. Gallagher, general manager of another big Dayton Malleable foundry, the Ironton Malleable Division, feels the same way about Durez resins and the service that goes with them.

The Ironton foundry pours high-strength pearlitic malleable for gears, sprockets, camshafts, chains, transmission parts, truck brake shoes, axle and differential parts.

Ironton production men say "We get less peel—less of every problem—with Durez resins in our molds and cores."

These men, too, like the drum-to-drum consistency of Durez that helps keep the ups and downs out of casting quality.

Resin problem? Here's help

If your shell molding and coring results aren't all you would like them to be, have a talk with your Durez sales engineer. He's foundry-trained—can draw on a 38-year background of resin research and application. He has helped many foundrymen whip shell-molding and coring problems and get consistent results. Call him in soon.

How-to-do-it information

Regardless of which resins you now use, you will find the new 32-page "Durez Guide to Shell Molding" helpful. Completely revised, it contains recommendations on patterns, materials, mixing, temperatures, lubricants, molds, cores. It's by men who have spent years learning the subject. Write for your copy today.

DUREZ® HOOKER CHEMICALS PLASTICS

PLASTICS DIVISION

HOOKER CHEMICAL CORPORATION

1002 Walck Road, North Tonawanda, N. Y.

shop, of minimizing downtime. The die unit, therefore, should be so arranged that it or the entire die unit assembly can be removed easily and quickly. If the new die is preheated, operations can begin immediately.

While the new die is running, the operator in charge of the bank of machines can be dismounting the die which has just finished a production run and remounting a new die in place on the unit to go into production on the next open machine. Thus, the major factor involving downtime—that is, die changeover—is eliminated almost completely. Additionally, design of the machine must permit replacement of wear parts in minimum time.

It is obvious that this new concept in diecasting—that is, the ability to run single-cavity dies at high rates of speed—promotes savings in many areas. For example, the elimination of multiple-cavity dies means lower initial die cost, lower inspection costs, and better tolerances from one part to the next. The advantage of having one operator run up to six machines on a continuously producing basis is self-evident. One of the major benefits, however, concerns quality of the castings produced.

Probably the major cause of variations in casting quality is the inability to maintain constant production cycling without the introduction of process variables. Variations in metal temperature, die temperature, and duration of casting cycle (dependent on how long it takes to remove the casting, clean flash and dirt, and lubricate die) obviously cause variations in the thermal balance of the die. This imbalance in turn results in castings which show such defects as blisters, blows, soldering, etc.

Automatic operation eliminates these variations in operating technique. Therefore this type of automated unit becomes, in effect, an optimum, highly skilled operator capable of producing the best possible casting that can be made under the most precise operating limits. It enables the diecasting process to become considerably more competitive with other fully automated manufacturing techniques such as stamping than it could be previously.

Circle 631 on Page 53

Men of Industry

● ROBERT D. EVERETT
. . . supt., Melrose Park

● HARRY MATTHIESON

● JOSEPH J. SHIEL
. . . Arwood Precision Casting Corp. appointments

● B. D. CLAFFEY
. . . named vice president

● **Robert D. Everett** has been appointed superintendent of the Melrose Park Works, Chicago, National Malleable & Steel Castings Co., Cleveland. Mr. Everett, a graduate of Lehigh University, joined National in 1947 and was named finishing superintendent at the company's Sharon, Pa., plant in June, 1958.

J. T. Sohn, vice president, Bedford Foundry & Machine Co., Bedford, Ind., was recently elected president of the Indiana Manufacturers Association, Indianapolis.

Robert J. Laws, assistant general sales manager, has been appointed general sales manager, Baker Industrial Trucks, Div. of Otis Elevator Co., Cleveland, succeeding **R. T. Tiebout,** resigned.

James E. Partlow has been named assistant general sales manager, General Refractories Co., Philadelphia. He formerly was district sales manager for the company in Houston. Other appointments made by the company include **George C. Mayhew,** Detroit district sales manager; **George H. King,** administrative sales division, Philadelphia; **Sumner E. Brumbaugh,** assistant district sales manager, Pittsburgh; **Edward B. Huffman,** Chicago; **John F. Small,** assistant district sales manager, St. Louis; and **Leonard D. Borter,** Pittsburgh.

● **Harry Matthieson** has been named to the newly created post of vice president, process engineering, Arwood Precision Casting Corp., New York. He joined Arwood in 1954 as production manager and was named plant manager that same year. **Joseph J. Shiel** has been advanced to plant manager of the company's Brooklyn plant. Mr. Shiel joined the company in 1947.

E. A. Loria, staff metallurgist in the central metallurgical department, has been appointed product metallurgical engineer in the customer technical service section, Crucible Steel Co. of America, Pittsburgh.

William H. Steinberg, technical consultant and recently sales manager, abrasive wheel department, Manhattan Rubber Div., Raybestos-Manhattan Inc., Passaic, N. J., retired recently after 41 years with the company.

Fred E. Huss has joined Lewis-Shepard Products Inc., Watertown, Mass., as representative in northwestern Ohio, with headquarters in Toledo.

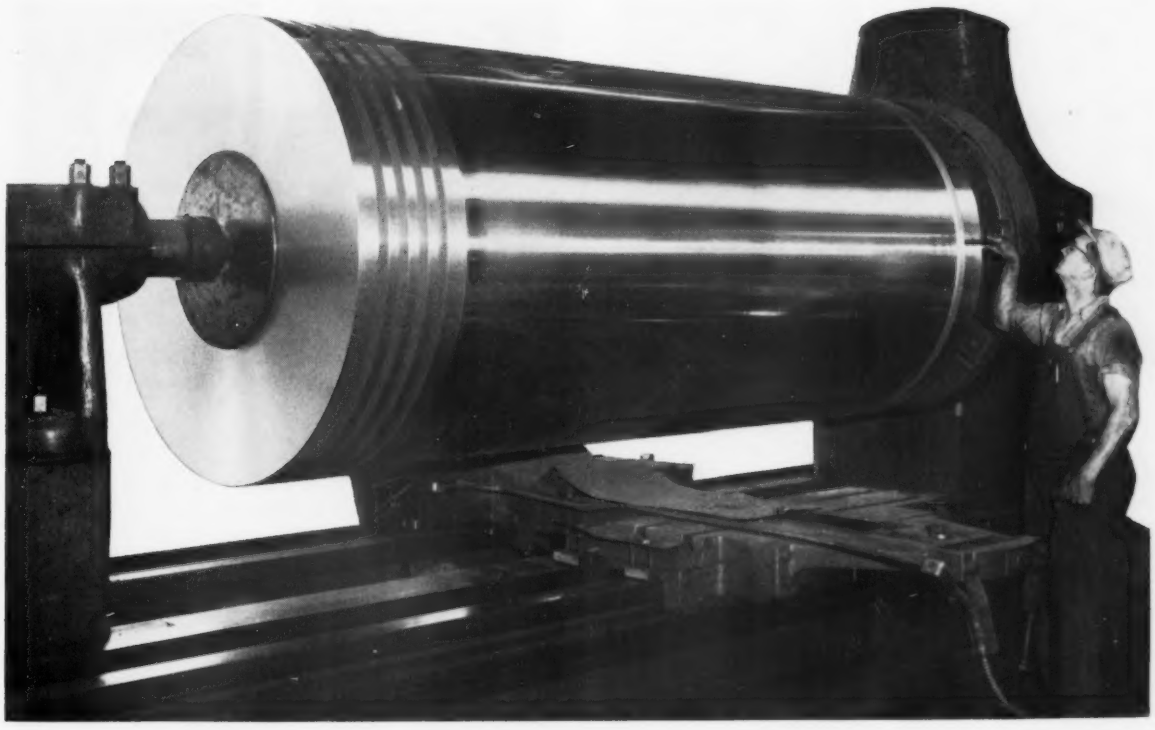
Clarence E. Griese, formerly with Geo. A. Tinnerman Corp., Cleveland, has joined Ohio Hoist Mfg. Co., Lisbon, Ohio, as general sales manager.

● **B. D. Claffey,** general manager of the GHR Div., Dayton Malleable Iron Co., Dayton, Ohio, has been named a vice president of the company. He will continue his position with the GHR division. Mr. Claffey formerly was president, Acme Aluminum Alloys Inc., Dayton. In 1954 he became general manager of Dayton Malleable's Ohio Malleable Div., Columbus, Ohio, and was transferred to GHR as general manager the following year.

Dr. J. G. Pearce has retired as director of the British Cast Iron Research Association, Birmingham, England. The institute, which was founded in 1921, has been directed by Dr. Pearce since 1924. Active on numerous national and international committees relating to the foundry industry, Dr. Pearce has written and lectured widely both in Europe and the United States.

Walter H. Kraus, former assistant sales manager, West Steel Casting Co., Cleveland, has been appointed sales representative, Lectromelt Casting Div., Akron Standard Mold Co., Barberton, Ohio.

Dr. Clarence E. Sims, recently retired technical director and now consultant to Battelle Memorial Institute, Columbus, Ohio; and **Clarence T. Marshall,** vice president and general manager, Coke & Iron Div.,



51,300 Pounds of Skilled Workmanship and . . .

This main ram for a hydraulic press was made by the Goslin-Birmingham Manufacturing Company of Birmingham, Ala., under the most exacting specifications. A 32-40 micro-finish was required. Moulding, casting, machining and polishing required the highest foundry and machine shop skills. The iron used was Woodward malleable, which has demonstrated its outstanding dependability in the production of quality castings of all types and sizes.

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For quotations, write or call our Sales Department, Woodward, Ala.
Phone Bessemer, Ala. HAmilton 5-2491
or Sales Agents for territory North of Ohio River:
HICKMAN, WILLIAMS & COMPANY with Sales Branches at—

609 Bona Allen Building, Atlanta 3, Ga.; 230 North Michigan Avenue, Chicago 1, Ill.; First National Building, P. O. Box 538, Cincinnati 1, Ohio; 1659 Union Commerce Building, Cleveland 14, Ohio; 1203 Ford Bldg., Detroit 26, Mich.; P. O. Box 335, Duluth 1, Minn.; 412 Guaranty Bldg., Indianapolis 4, Ind.; 70 Pine St., New York 5, N. Y.; 1500 Walnut Street Bldg., Philadelphia 2, Pa.; 1910 Clark Bldg., Pittsburgh 22, Pa.; 902 Syndicate Trust Bldg., St. Louis 1, Mo.

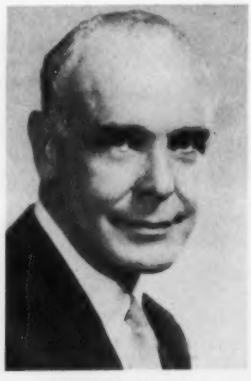
WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1882

Circle 632 on Page 53

SIMON D. DEN UYL



● TERRY W. KUHN

● H. BLAKE THOMAS

● RICHARD C. AYLWARD

. . . newly elected officers, Bohn Aluminum & Brass Corp.

Pittsburgh Coke & Chemical Co., Pittsburgh, will be honored by the Metallurgical Society of the American Institute of Mining, Metallurgical and Petroleum Engineers at its national convention in San Francisco, Feb. 15-19. Dr. Sims will deliver the Howe memorial lecture. Mr. Marshall will receive the J. E. Johnson Jr. award established to encourage creative work in metallurgy or manufacture of pig iron.

● **Simon D. Den Uyl** has been elected chairman of the board, Bohn Aluminum & Brass Corp., Detroit, after serving as president since 1949. **Terry W. Kuhn** has been advanced to president from his former post as executive vice president. **Richard C. Aylward,** general sales manager, was elected vice president of sales; and **H. Blake Thomas,** general manager, Betz Div., was elected vice president.

J. T. Sabol has been appointed district manager of the new Cleveland office, Inductotherm Corp., Delanco, N. J. Mr. Sabol had been with Tocco Div., Ohio Crankshaft Co., Cleveland, for 14 years.

Harry E. Gravlin Jr. has joined Hamilton Standard, division of United Aircraft Corp., Windsor Locks, Conn., as production manager. Mr. Gravlin has been associated with Ford Motor Co., Claude B. Schneible Co., and the Chrysler Corp.

● **N. Stanley Snyder,** district manager, Buffalo, has retired from Link-Belt Co. after 52 years of service. He joined the company in 1906 and has been manager at Buffalo since 1924. **R. F. Betts,** district sales engineer in Boston for 9 years, succeeds Mr. Snyder. **E. L. Mills** has been appointed district manager at Duluth, replacing **R. P. Sayers** who is being advanced to the Chicago district sales office. Mr. Mills has been district sales engineer at Pittsburgh since 1954; Mr. Sayers was appointed district manager at Duluth in 1956 and has been with the company since 1933.

D. S. Harder and **Ray H. Sullivan,** manufacturing executives of Ford Motor Co., retired Jan. 31. Prior to joining Ford in 1946, Mr. Harder was president of the E. W. Bliss Co. Recently he was vice president and technical adviser to the president and chairman of the board. Mr. Sullivan joined the Ford organization in 1948, and two years later was elected vice president. He was in charge of all engine and metal stamping activities from 1950 to April, 1958, when he retired from direct line responsibilities to assist Mr. Harder on special projects.

Glenn H. Crocker has been appointed general sales manager, Roots-Connersville Blower Div., Dresser Industries Inc., Connersville, Ind. Joining Roots-Connersville in 1948, he has served as field engineer, chief application engineer and manager, factory sales. **Philip J. Bettendorf** has been named district manager of the Detroit office to succeed **Daniel R. Fulton,** who will open an office in Houston;

● N. STANLEY SNYDER

● R. P. SAYERS

● E. L. MILLS

● R. F. BETTS

. . . Link-Belt district office appointments

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CORPORATION
OF AMERICA

"True, some silicon products are 'cheaper' than others . . ."

. . . But the "cheaper" product may cost you more in the long run! Real economy and efficiency come only when the *right* silicon product is mated with the *right* application. Often, because silicon has so many different uses, it's not so easy to select the product that will give best results — at lowest final cost.

That's where your VCA representative comes in. He can be a real help in determining the ideal form and type of silicon for the job you have to do. And the reason he's so well qualified is that VCA offers a complete line of silicon products — and *knows* its line! Get an impartial recommendation that can mean significant savings in your operations. Call your nearest VCA district office soon! Vanadium Corporation of America, 420 Lexington Avenue, New York 17, N. Y.
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A COMPLETE LINE OF CORE HANDLING EQUIPMENT

MODEL C-1

MODEL A-27

You can count on CMD for the finest in core handling and allied foundry equipment. Our core trucks, barrows and racks are built to handle and transfer cores safely and easily. The secret is CMD's exclusive resiliency—a resiliency caused by coil, leaf spring and pneumatic cushioning—the smoothest core ride in the industry.

Look to CMD for superior quality, longer life, less maintenance in foundry products.

- CORE BARROWS
- CORE TRUCKS
- RESILIENT CORE RACKS
- WOODEN FLASKS
- WOODEN BOTTOM BOARDS
- BAG HOLDING TRUCKS
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- SLIP JACKETS

Send for complete information on CMD Foundry Products

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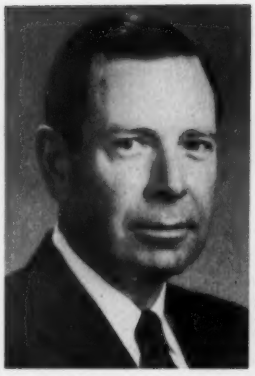
Circle 634 on Page 53



● GEORGE C. RODGERS ● JOHN G. LISKOW ● JOHN M. KANE
. . . appointments announced by American Air Filter Co.

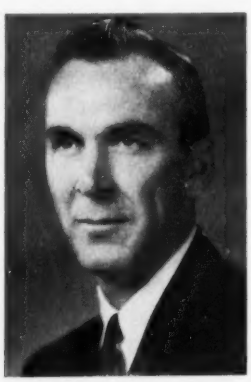
H. E. Newsome has been placed in charge of an office in Los Angeles; and **Paul E. Johnson** has been named manager of the Atlanta office.

● **John M. Kane** has been elevated to director of the foreign group and of the central staff, American Air Filter Co., Louisville. He formerly was manager of the company's Dust Control Products Dept. American Air Filter has merged its Dust Control and Engine & Compressor Products departments to form the Process Air Div. with **George C. Rodgers** as manager. Mr. Rodgers had been manager of the Engine & Compressor Products Dept. **John G. Liskow**, formerly assistant manager, Dust Control Products Dept., has been appointed sales manager of the new Process Air Div.

● **Thomas F. Scannell** has been appointed vice president, general sales manager, Falk Corp., Milwaukee. Mr. Scannell, who joined Falk in 1929, has been sales manager since 1943. **Sands G. Falk** has been appointed eastern regional sales manager, with offices in Milwaukee, replacing **H. Douglas Stier** who retired Dec. 31. Mr. Falk entered the foundry sales field in 1944, and has been manager of marketing research since 1956. In 1957 he served as chief of the Castings Branch, Iron and Steel Division, BDSA, Washington. **Kenneth O. Hood**, at present manager of the western region, has been named manager of the new midwestern region with offices in Milwaukee.

Crawford B. Murton has been promoted to sales manager, Vesuvius Crucible Co., Swissvale, Pa., succeeding **Richard H. Stone**, retired. Mr. Murton formerly was district sales representative. **Ben R. Shipley** has been appointed assistant sales manager.

Henton Morrogh, for many years head of the research department and lately deputy director of the British Cast Iron Research Association, has been named director. He succeeds **J. G. Pearce**, retired. Mr.



● THOMAS F. SCANNELL ● SANDS G. FALK
. . . Falk Corp. sales appointments

Circle 635 on Page 53

new ANDREX
140 KV x-ray unit

doubles x-ray output

4 ma instead of usual 2 ma
quicksteps through
twice as much work per day

Costs no more than half-powered units —only $2800.

full-bodied power

4 ma... cuts exposure time in half

x-rays 1¼" steel in 45 seconds

fine detail: with 1.5 mm focal spot
compact: will pass through a 6" opening
lightweight: 50 lbs. easy one-man load
won't overheat: motor-circulated oil insulation with thermal safety cutoff

full dress control

with "big machine" range and certainty

full-size MA and KV meters
(not mere makeshift "penetration" or "reference" meters)

range 50 to 140 KV
range 1 to 4 MA
} both under continuous control use *any* technic you want

direct operation off any power line
simply plug in on 110, 220, 380, 440, or 480 volt lines:
no extra autotransformers needed

fully weatherproofed
both head and control are gasket-sealed:
dustproof and waterproof
no separate "carrying case" to lug along

Picker x-ray

For details on this unit or any of the other machines or services listed below call any Picker Branch Office (see local 'phone book) or write

PICKER X-RAY CORPORATION
25 South Broadway, White Plains, N. Y.

one stop for everything in industrial radiography

ANDREX	portable x-ray units—130 KV, 140 KV, 160 KV, 200 KV, 260 KV
PICKER	x-ray units—35 KV Beryllium window, 90 KV, 150 KV (stationary and mobile) 270 KV portable, intensified—image fluoroscopes
TECH/OPS	units for isotope radiography—sources, equipment, containers for Iridium ^{192} Cobalt ^{60} Thulium ^{170} and Cesium ^{137}
ACCESSORIES	. . . films, tanks, darkroom sundries illuminators, *everything*

Circle 635 on Page 53

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KEOKUK SILVERY PIG IRON
SILICON METAL—OTHER FERROALLOYS

Keokuk Silvery and magnets go together. Means quick, economical unloading. Other Keokuk alloys also incorporate customer convenience as well as top quality. See our new booklet—"For Lower Costs, Higher Quality Products"—it shows why easy-to-handle Keokuk alloys give you a consistent quality melt! Send today.

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Wenatchee, Division, Wenatchee Washington

When you think of SILICON . . . think of KEOKUK!

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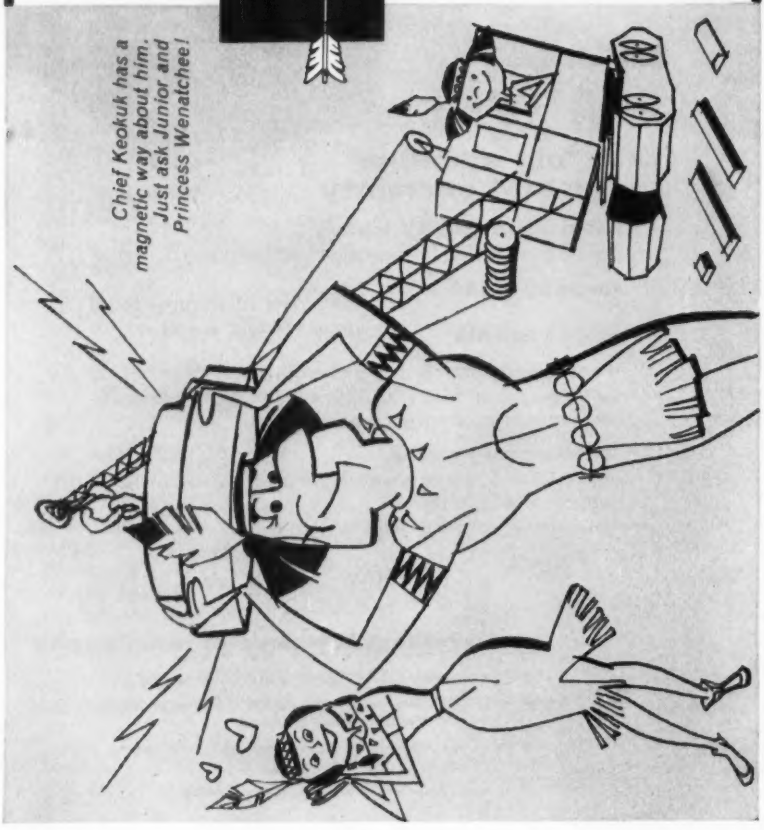
Chief Keokuk has a magnetic way about him. Just ask Junior and Princess Wenatchee!



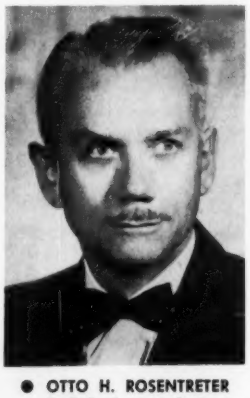
Morrogh received the W. H. McFadden Gold Medal of the AFS in 1952 in recognition of his work in the development of nodular iron.

• **Ralph M. Trent** has been elected president, and **Robert H. McCauley,** director, Pangborn Corp., Hagers-

● **RALPH M. TRENT**
. . . Pangborn Corp. pres.

town, Md., filling the unexpired term of the late Victor F. Stine. In 28 years with the company Mr. Trent has served as Pittsburgh and West Coast district manager, and since 1957 as executive vice president. Mr. McCauley has been the company's general counsel for 30 years.

• **Otto H. Rosentreter,** president, Otto H. Rosentreter Co., Bell Gardens, Calif., is serving as chairman



● **OTTO H. ROSENTRETER**
. . . S. Cal. chapter chairman

of the Southern California Chapter, AFS. Mr. Rosentreter joined National Engineering Co., Chicago, in 1936 and moved to Los Angeles as West Coast district manager in 1946. In 1950 he founded his company which in addition to National

Engineering, also represents Osborn Mfg. Co., Foundry Equipment Co., Shell Process Inc., Hartley Controls Corp., and Detroit Electric Furnace.

• **Elden Auker,** vice president, marketing, Bay State Abrasive Products Co., Westboro, Mass., has

● ELDEN AUKER
. . . heads wheel mfrs.

been elected chairman, board of directors, Grinding Wheel Institute. It is composed of 33 of the country's grinding wheel manufacturers.

• **Joseph R. Forrest** has joined the sales staff, Philadelphia Quartz Co., Philadelphia. He is assigned to the

● JOSEPH R. FORREST
. . . Mich.-Ohio sales

Michigan and Ohio territory with headquarters in Detroit, after completing the company's laboratory and technical training course.

Donald MacBrien has been appointed sales manager of both industrial and domestic coke sales, Philadelphia Coke Div., Eastern Gas & Fuel Associates. Mr. MacBrien has been with Philadelphia

Two-way Sand-handling System

No "dead-heading" at Eastern Malleable

When your sand has to be moved long distances between preparation area and the points of use you can take a tip from The Eastern Malleable Iron Co.'s Wilmington, Del. foundry where these hauls are about 600 feet.

They solved this problem with the use of speedy, high-capacity "PAYLOADER" tractor-shovels and a set-up that practically eliminates all "dead-heading" or travel without payload. So the "PAYLOADER" units are able to scoop up sand from the pouring floor, carry it 600 feet to the shaker, re-load with prepared sand from the nearby pile for the return trip and deliver it to any of the 35 molding stations.

Eastern's newest "PAYLOADER" is this model H-25 — the last word in tractor-shovel design and productivity. It has a carry capacity of 2,500 lbs., it has power-steer, power-shift transmission with two speed ranges both forward and reverse, power-transfer differential and the fullest system of air and oil filters and grease seals for long-life protection and low maintenance.

Your "PAYLOADER" Distributor is ready to give you all the facts on the H-25 or any other "PAYLOADER" models that best fit your needs.

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Circle 636 on Page 53

AIRETOOL
PNEUMATIC TOOLS
do 9 hours work in 8

The powerful air motors used in Airetool pneumatic tools step up operator production without increase in fatigue. They deliver constant speed over long work periods . . . without heat-up or stall. And lightweight, balanced-design Airetool production tools handle comfortably and easily—take lots of abuse with no loss in efficiency. As a result, Airetool users report an extra hour's production in a day's work.

HORIZONTAL GRINDERS

For general grinding, snagging, buffing and wire wheel work, 4" to 8" wheel capacity.

VERTICAL GRINDERS

For cup and depressed center wheels, grinding, sanding and wire wheel work. 6" wheel and 7 to 9" sanding disc capacity.

MIDGET DIE GRINDERS

For intricate precision grinding, filing and cutting jobs with carbide burrs and abrasive wheels. 38,000 to 60,000 rpm operation.

PNEUMATIC DRILLS

High efficiency, portable models. 3/32, 3/16, 1/4, 1/2, 5/8 and 3/4" capacities.

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Circle 638 on Page 53

● **ROBERT L. CLEVELAND**
. . . becomes general mgr.

● **N. WILLIAM MULLER**
. . . Great Lakes Carbon v. p.

Coke for 23 years and has been in charge of industrial coke sales for the last 11 years.

● **Robert L. Cleveland** has been named general manager of the Tonawanda Iron Div., American Radiator & Standard Sanitary Corp., New York, succeeding **Leo A. Merryman** who has retired after 37 years of service. **Albert D. Bright**, blast furnace superintendent, has become manager of operations, Mr. Cleveland's former position.

Robert W. Shaneck has been appointed to head the Dayton, Ohio, sales office recently established by Anchor Steel & Conveyor Co., Dearborn, Mich., covering central and southwestern Ohio.

● **Clayton D. Grover**, since 1954 president, Whitehead Metals Inc., New York, has been elected chief officer of the company. **Thomas M. Bohen**, who has served as chairman since 1954, has been elected honorary chairman of the board of directors. Mr. Bohen joined Whitehead as a salesman in 1914 and became president in 1939. Mr. Grover, who joined Whitehead in 1927, was made assistant to the president in 1939 and vice president in 1941.

● **N. William Muller** has been named a vice president, Great Lakes Carbon Corp., New York, and general manager of the research and development department, succeeding the late Dr. Samuel W. Martin. Mr. Muller's headquarters will be at the Chicago office, near the research center in Morton Grove, Ill.

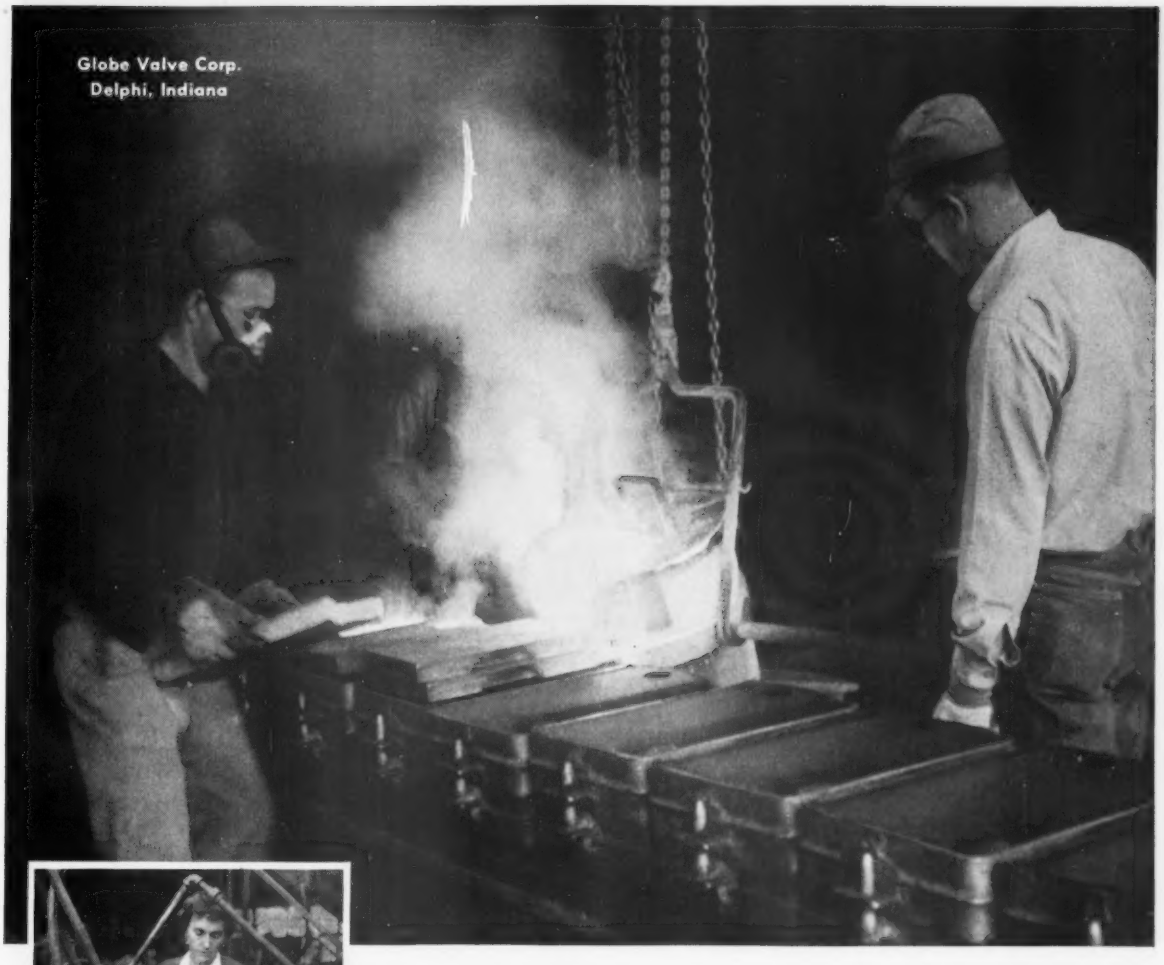
F. R. Barth has been elected vice president, finance, Pettibone Mulliken Corp., Chicago. **A. R. Gasiorek** has been named assistant to the president.

William J. Phillips has resigned as vice president and general manager, Crawford Steel Foundry Co.,

● **CLAYTON D. GROVER**

● **THOMAS M. BOHEN**

. . . officers advanced by Whitehead Metals



The Air Pressure Test is given to all Globe castings. Here, casting is subjected to 160 pounds of pressure. Others are given similar test under water. All must be perfect.

Intricate Core is typical of many produced by Globe Valve Corp. using Cities Service Delco #60 Core Oil. Here, the oil's green strength is particularly important.

Production up 30% in two years

Using Cities Service Delco Core Oil, Globe Valve Corp. sets quality standard that sends sales soaring.

With production up 30% during the past two years, Globe Valve Corp., makers of GERBER brand plumbing fixtures, is now pouring 11-million brass castings a year!

Key to this outstanding success is strictest quality control . . . control that extends to the nearly nine million cores required in this operation and their priceless ingredient, core oil.

Here, Globe gets the quality it demands from Cities Service Delco #60. Not in any vague sense, but in four easily demonstrable characteristics:

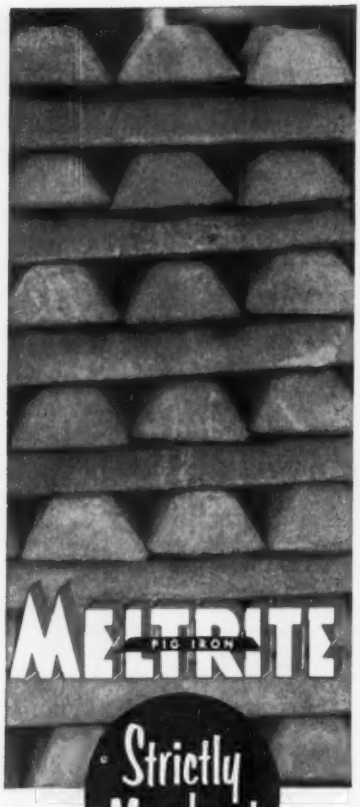
- Fast bake allowing high rate of output, greater total productions.
- Good collapsibility
- Good storage qualities
- Good green strength, so important with intricate cores.

Wherever production schedules are tight . . . wherever quality is paramount . . . wherever cores are difficult to make . . . that's where you'll find Cities Service Delco Core Oils. Get the facts from a Cities Service Lubrication Engineer. Or write: Cities Service Oil Co., 20 North Wacker Drive, Chicago 6, Illinois.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS

Circle 639 on Page 53



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Always in dependable supply.

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Serving Industry Since 1883

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Erie • Greensboro • Indianapolis • New York
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Circle 640 on Page 53

Bucyrus, Ohio. Presently traveling in New Zealand and Australia, he will visit steel foundries and related industries while in Australia.

• **James H. Sands**, executive vice president, Eclipse Fuel Engineering Co., Rockford, Ill., has been named

• JAMES H. SANDS
. . . named to BDSA

advisor to the director of the Metalworking Equipment Division, BDSA, Washington, for a six-month tour of duty. Mr. Sands has been in the industrial heating industry for 15 years.

• **Floyd R. Anderson** has been named chief metallurgist, Gardner-Denver Co., Quincy, Ill., and will

• FLOYD R. ANDERSON
. . . chief metallurgist

supervise metallurgical operations of all divisions of the company, both domestic and foreign. Mr. Anderson had been administrative assistant of the company's Denver division.

Lucian J. Courtney Jr. has been named manager, sales service, Coffing Hoist Division, Duff-Norton Co., Danville, Ill. He succeeds

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Highest Quality Foundry Coke

SINCE 1904

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Year after year MILWAUKEE SOLVAY COKE ranks as a superior foundry coke...made from *carefully selected* coal:

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Circle 641 on Page 53

A. M. Kelly, now district sales manager in San Francisco. Mr. Courtney, who had been manager of customer service, started with the company in 1956.

• **L. F. Harding** has been transferred by C. O. Bartlett & Snow

● L. F. HARDING
. . . transferred to Chicago

Co., Cleveland, from Detroit and placed in charge of sales in the Chicago district.

• **Charles R. Allen** has joined D. K. MacLennan Co., Los Angeles. He will serve as technical representa-

● CHARLES R. ALLEN
. . . technical representative

tive for Misco Precision Casting Co., Whitehall, Mich., and Casting Engineers Inc., Chicago, investment casting producers. Mr. Allen formerly was with AiResearch Mfg. Co., Phoenix, Ariz.

Andrew M. Mitchell, formerly with Taylor Forge & Pipe Co., Gary, Ind., has joined Youngstown Steel Car Corp., Niles, Ohio, as director of engineering and manufacturing.

Circle 642 on Page 53→

Planet cope tipper mechanism (left) and shakeout area

HANDLES MOLDS ON EIGHT SECOND CYCLE

PLANET AUTOMATIC SHAKEOUT SYSTEM ELIMINATES "BARBECUE PIT"

This automatic shakeout system, which eliminates pitchfork men in the pit, was recently installed by Planet Corporation at a large automobile manufacturer's foundry. A high production system, it handles one mold every eight seconds.

Here's how it works:

As a mold reaches the shakeout area, a tipper mechanism strips the 500 lb. cope flask off the lower portion, inverts it, and drops it onto a shakeout unit. Oscillating action shakes out the sand. It is then moved back to the cope molding machines automatically by powered roller conveyors.

The drag flask is pushed by an air cylinder onto a tipper table. Its tipping action throws the hot castings onto another shakeout unit. Following shakeout, an oscillating conveyor moves the castings and automatically loads cooling buckets. The drag flask is then lowered and pushed onto a third shakeout unit where it is cleaned and then carried to the drag molders by powered roller conveyors.

The hot sand, which has been removed from the flasks and castings, is collected below the shakeout units, and conveyed back to Planet's sand mixing and distributing system for re-use.

The entire shakeout operation is automatic and requires supervision by only one man.

IT PAYS TO PLAN WITH PLANET

If your foundry has a shakeout or materials handling problem, let Planet demonstrate how its engineering skill and know-how can help you. It paid this manufacturer to "Plan with Planet," it will pay you too. Write or phone today . . . there's no obligation, of course.

PLANET CORPORATION

1818 SUNSET AVENUE
LANSING, MICHIGAN

- ENGINEERED HANDLING SYSTEMS
- AUTOMATION EQUIPMENT
- FOUNDRY HANDLING EQUIPMENT

87

Electric Furnace Conference

Considers Melting Practice

By EDWIN BREMER
Metallurgical Editor

● SIXTEENTH annual Electric Steel Conference marked an expansion in the field usually covered to include electric furnace production of carbides, ferroalloys, and other metals as well as steel.

Sponsored by the Electric Furnace Committee, Iron and Steel Division, American Institute of Mining, Metallurgical and Petroleum Engineers Inc., the meeting was held at the Statler-Hilton Hotel, Detroit, Dec. 3-5. Attendance exceeded 950.

Paul R. Gouwens, supervisor, foundry and steelmaking research, Armour Research Foundation, Chicago, was elected chairman of the 1959 conference. It will be held at the Sheraton - Cleveland Hotel, Cleveland, Dec. 2-4. A. C. Ogan, superintendent, electric furnace department, U. S. Steel Corp., Duquesne, Pa., was elected chairman of the Electric Furnace Executive Committee.

Gas Content—In a discussion of steel foundry practice, M. Boris, American Steel Foundries, Granite City, Ill., reported that comparison of heats of grade B steel produced in 100, 200 and 1000-lb laboratory induction furnaces and in a 9-ton basic-lined arc furnace did not show any appreciable differences in gas content with various additions to the heats.

Pinhole Porosity—Study of pinhole porosity in high-alloy steels of the stainless type, by R. J. Mangone, A. M. Hall and C. E. Sims, Battelle Memorial Institute, Columbus, Ohio, and W. T. Bryan, Duriron Co., Dayton, Ohio, indicated that foundry variables having important influences on that condition include hydrogen content of the melt, pouring temperature, and moisture present in the mold.

The authors presented curves showing relationships between the various factors which can be used as guides for selecting conditions for producing sound castings when melt hydrogen content is known. For example, when weather conditions prevent control of melt hydrogen within the desired low range, reduction of mold moisture or pouring at a lower temperature might minimize porosity. Also, addition of small amounts of selenium permits more hydrogen in the melt and higher pouring temperatures before porosity occurs.

PAUL R. GOUWENS
1959 Conference Chairman

Induction Melting — James T. Gow and C. F. Hamilton, Sandusky Foundry & Machine Co., Sandusky, Ohio, described the high-frequency induction furnace melt shop installed in the firm's foundry. It includes six melting stations equipped with one 1000-lb capacity furnace, one 2000-lb, and four 11,000-lb capacity units. Power is supplied by two 1250-kw motor generator sets which can be operated separately or in parallel, feeding power to one or up to five of the six stations at one time. In addition, the authors discussed furnace lining practice and melting procedures for various alloy steels.

Stephen Marmaroff, Babcock & Wilcox Co., Barberton, Ohio, described the high-frequency induction furnace installation in his firm's foundry. It includes three 1200-lb and one 3000-lb capacity units powered by 700-kw motor generators. Furnace linings and melting practices were discussed.

Joseph Dewez, R. Berger, A. Paquot, and P. Nicolaides, Societe Anonyme Usines E. Henricot Court, St. Etienne, Belgium, discussed oxidation and deoxidation practice in the high-frequency induction furnace.

Desulfurization — Procedure for producing steel low in sulfur and phosphorus was described by John Zotos, Rodman Laboratory, Watertown Arsenal, Watertown, Mass. Steels included 1045, 4140, 4325, 4330 and 4340 types, and subsequent physical testing of specimens showed that the ductility and impact resistance of high-nickel 4325 and 4330 cast steels are improved significantly by the lower sulfur and phosphorus contents.

Desulfurization of steel by injecting lime with and without addition of a crushed aluminum-magnesium (50-50) alloy was discussed in a paper by D. E. Parsons and S. L. Gertsman, Department of Mines and Technical Surveys, Ottawa, Ont. Carrier gas was argon. Treatment of acid-melted steel in the ladle with 18 lb per ton of calcined lime and 6 lb per ton of

THE PALLET LINE SYSTEM
OF MOLD HANDLING

A MEANS FOR HIGHER MOLD PRODUCTION AND LOWER MOLDING COSTS

Here is what one foundry did to get back into the competitive picture:

"We are a jobbing shop pouring castings from a few ounces to 80 lbs. Our average mold weight is about 25 lbs. Most jobs are rigged up on match plates. However, we do operate one cope and drag floor daily. Our foundry employs up to 125 men and we have employed as many as 45 molders, although our molding force with our new system is now 12 men.

View from the pouring floor of a large foundry showing the molding end of the Pallet line system. Molds are handled on pallet cars and automatically dumped at end of lines into a vibrating pan conveyor. Pallet Cars and boards are automatically returned on an underneath track system.

Sometime ago we made the transition to synthetic sand, employing a muller to blend Lake and Juniata sands.

The Melting Department has two No. 8 cupolas used on alternate days. Two men perform the entire charging operation using a mobile crane with magnet, weigh car and charging bucket crane mounted on a mono-rail.

With this picture in mind, we concluded that to be competitive, mechanization had to be installed. Several engineering firms were contacted for plans. We had some previous bad experience with a "Merry-Go-Round" molding system, so this type was eliminated from the beginning. A **Pallet Line** system was felt to be more versatile for our jobbing work, particularly with regard to various flask sizes, wide range of section sizes — keeping in mind different mold cooling times, alloying, and wide variety of different molding techniques, typical of jobbing shops.

The Newaygo Engineering Company was selected to engineer, build, and install the new Pallet Line System and Accessory Sand Conveying equipment.

Some of the major items considered were as follows:

1. Total Length of Lines.
2. Length of Pouring Area.
3. Length of Cooling Area.
4. Position of Overhead Sand Hoppers
   (a) Molder at 180°, 90°, or 45°.
5. Types of Pallet Lifts — Power vs. Manual.
6. Types of Dumps — Hydraulic vs. Counter-weights.
7. Oscillating Sand and Casting Conveyor.
8. Size of Sand Storage Bin above Muller.

The total length of each of the eight lines is about 75 feet. The length of pouring area 30-35 feet and cooling area is about 15 feet. We decided on locating the molder on a line 45° to the pallet lift, that is, each molder is almost looking at the back of another molder. Our pallet lifts are hydraulic, operated by each molder by the press of a button, and may be adjusted to stop in any position between bottom and top. When the pallet is loaded, the molder presses button again, actuating the pallet to the top position. He then pushes pallet off the lift and presses button to return lift to the bottom. We have hydraulic pallet dumps. All dumps are operated by one man.

Another item which was given a lot of thought was the sand storage bin above the muller. One 150-ton bin was erected and the layout provides for another 150-ton bin in the future.

Sand is distributed to each molder by belt conveyor. This is a distance of about 175 feet.

Contrary to what we thought, our maintenance experience with this new equipment has been fairly trouble-free. There has been no excessive down time.

Our tribulations were primarily method, personnel, and iron. The coordination of iron distribution in regard to temperature and efficient pouring with a minimum of waiting time. A definite problem was securing a low melting rate to provide enough working hours for a small pouring crew and still not overrun the molders. Another problem — was to increase the speed of eight molders who had molded on hand floors all of their molding careers. Training men to pour with mechanized pouring devices was also time consuming. Along with personnel and coordination problems at this time, was the fact that we changed to one Iron Mix where before we poured two — shrinkage and gating problems — are still there — but, a lot of patterns have been corrected. Naturally, the success of a new system depends upon the economy of operation and increased production. Production per molder increased approximately 50%. Part of this increase is due to extra molding time — the molders no longer pour off their molds. A specific example of increased production is as follow:

On the old conventional floors — 18 to 20 molders produced 16 tons/day. Now 12 molders produce 20 tons/day.

Pallet lines may be your solution to lower costs and increased production. We have certainly found this to be true in our own case. Other advantages the Newaygo Pallet System has given us are operational flexibility, less scrap loss, and a competitive edge. Most of all, it has meant regaining old customers and getting new business."

SEE NEWAYGO PALLET LINES IN ACTION

NEWAYGO engineering company
NEWAYGO, MICHIGAN

Send for our new 16 mm sound film featuring Progressive Mechanization in 9 foundries.
Use of film is free.

Circle 643 on Page 53

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to FINISHing

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it's
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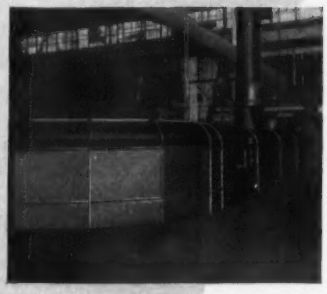


COOLING—Large volume of air passing through cooling tunnel removes fumes, cools molds.

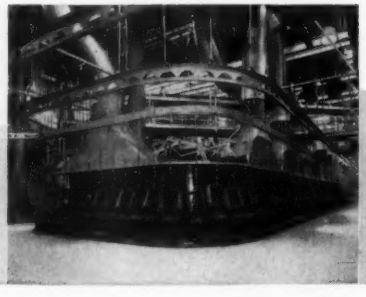
You'll find KIRK & BLUM Systems in leading foundries. To control dust and fumes from all foundry operations, count on KIRK & BLUM for the complete job—design, fabrication and installation.

From 50 years of experience, Kirk & Blum Engineers have gained skill that can be used effectively in your foundry, large or small. For a no-obligation survey or further information, write: The Kirk & Blum Mfg. Co. 3108 Forrer Ave., Cincinnati 9, Ohio.

GRINDING-SNAGGING — Battery of double grinders exhausted by Kirk & Blum system; dry collection.

KIRK & BLUM

DUST AND FUME CONTROL SYSTEMS



POURING—Hood collect fumes over entire length of moving floor, "Pouring" station.

aluminum-magnesium alloy resulted in sulfur reductions up to 40 per cent from an initial 0.050 per cent sulfur. Without the alloy, reduction was only about 20 per cent

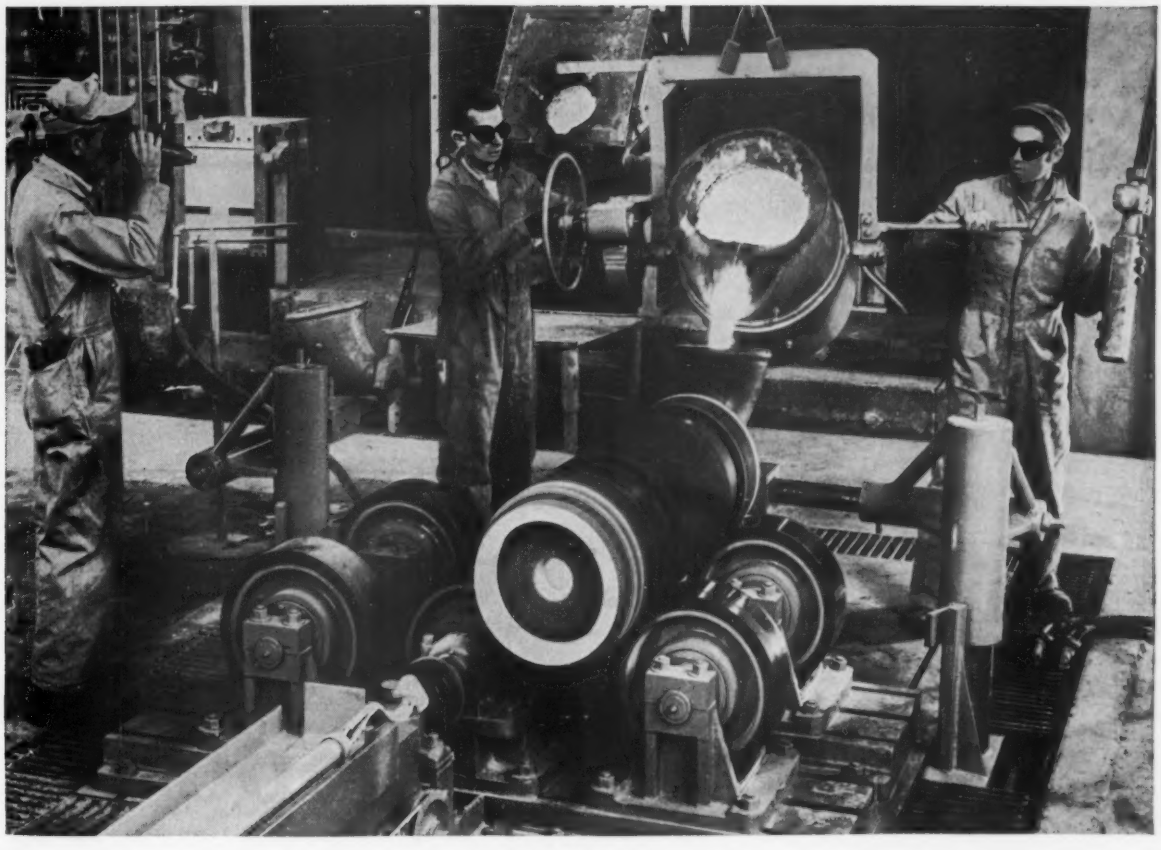
Basic steel was treated in the furnace under a basic slag, and with an injection of 24 lb per ton of calcined lime and 6 lb of aluminum magnesium sulfur was reduced from 0.020 per cent initially to 0.0008 per cent. Cost of the treatment was estimated to be $3.50 to $8.50 per ton.

Furnace Cooling—Significant advantages resulted from water-jacketing a 2-ton electric arc furnace with an 8-ft shell melting 7800-lb charges, according to V. J. Howard, Oklahoma Steel Castings Div., American Steel & Pump Corp., Tulsa, Okla. Jacketing consists of five sections about 30 in. wide and 21 in. high placed around the exterior of the shell with a cooling ring around the outside edge of the roof. Cooling extended the lining life from 331 heats to 530. Refractory cost per ton without cooling was $0.311 while with cooling it was $0.195, a saving of 37.3 per cent. The kwhr consumption per ton was 453 without cooling and 445 with cooling.

Split Heats—Split-heat techniques were discussed by Gordon Pride, Canadian Unitcast-Steel Ltd., Sherbrooke, Que.; S. C. Smith, Texas Foundries Inc., Lufkin, Tex.; J. W. Tibbits, Canadian Steel Foundries Ltd., Montreal, Que., and N. H. Keyser, Battelle Memorial Institute, Columbus, Ohio. Usual practice is to select a base heat to which various alloying additions can be made to bring it within specifications.

Desired amount of steel preferably at a temperature of 3000 to 3050° F is tapped from the furnace into a well-preheated ladle, and the alloying agents added. Temperature losses can be reduced in the case of small quantities of steel by preheating the alloys to be added. The same applies to large additions of alloys. In the case of 14 per cent manganese steel, the ferromanganese addition is melted in a silicon carbide crucible, and poured into the molten steel. One of the speakers pointed out that additions of 5 to 6 per cent alloys could be made without any temperature drop through use of exothermic type alloys.

Circle 644 on Page 53



WHY GOOD CENTRIFUGAL CASTING DEMANDS INDUCTION MELTING

Though centrifugal casting has values apart from any melting furnace used, it achieves its ultimate performance only with induction melted metals. You may have wondered yourself why the vast majority of critical centrifugal castings are poured from Ajax-Northrup induction furnaces. The reasons are many—

Take purity for example. One major advantage of centrifugal casting is that the spinning concentrates impurities such as dirt, slag particles, even gas, at the internal skin, where they can be machined away easily. Obviously, the purer the melt, the thinner the skin to be machined. And Ajax-Northrup induction melting has proved itself many times over to be the purest melting method known!

Or take uniformity. The electromagnetic stirring action inherent in the Ajax-Northrup induction furnace assures absolute uniformity of chemical composition and temperature throughout the melt, resulting in consistently homogeneous castings, even with alloys containing metals of widely varying densities such as Al, Ni, and Mo. In fact, users have been able to eliminate uniformity tests on Ajax melted centrifugal castings entirely.

The precise metal temperature control available with Ajax-Northrup induction equipment is another important consideration in the production of consistently uniform castings. Hot and cold pours are eliminated. And this combination of ideal temperature control and perfect mixing adds up to good, reproducible results.

Ajax-Northrup induction melting equipment, with its unique control system offers you maximum melting efficiency with resulting lower melting costs. The new compact designs incorporate many features which minimize floor space requirements, drastically reduce installation costs, minimize maintenance, and provide simple, more efficient operation.

Induction heating & melting

AJAX

NORTHRUP

Whether you're centrifugal casting tiny investment castings, massive rolls, or critical jet engine tail sections, you're sure to find an Ajax furnace that satisfies your needs perfectly. We'll gladly send you further information, or, if you wish, arrange a meeting with qualified furnace engineers to discuss your special requirements. Ajax Electrothermic Corporation, Ajax Park, Trenton 5, New Jersey.

ASSOCIATED COMPANIES: AJAX ELECTRIC COMPANY-AJAX ENGINEERING CORPORATION

A Lester B. Knight & Associates, Inc. Case History

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The Knight organization's extensive consulting experience has assisted many managements to establish better control of manufacturing. For one client, a materials control system lowered the cost of materials, yielding cost reductions in excess of $350,000 per year, together with elimination of ups and downs in the rate of production. Labor standards were developed and installed, reducing direct labor costs approximately 18%.

For consultation on any foundry problem, large or small, call on Lester B. Knight & Associates, Inc.

KNIGHT SERVICES INCLUDE:

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Circle 646 on Page 53

Obituary

VERNE E. MINICH, 91, founder and honorary chairman of the board, Wheelabrator Corp., Mishawaka, Ind., died Dec. 13 in New York. Mr. Minich organized the company in 1908 as the Sand Mixing Machine Co. to manufacture and sell a sandcutter. The airless abrasive

VERNE E. MINICH

blast machine for which the company is now named was invented and perfected under his guidance during the depression of the 1930s. Mr. Minich advanced from president to chairman of the board in 1941 and was named honorary chairman in 1957. He was the first president of the Foundry Equipment Manufacturers Association, serving from 1919 to 1921, and was a director of the American Foundrymen's Society from 1916 to 1921.

Howard C. Lauffer, associated in various capacities with the H. C. Macauley Foundry Co., Berkeley, Calif., died in Oakland, Calif., Dec. 30. The son of John Lauffer, partner of H. C. Macauley, Mr. Lauffer was a director of the company at the time of his death.

Joseph M. Fabian, 68, owner and founder, Michigan Ave. Foundry, Chicago, died recently.

Harry W. Titgen, 71, retired engineer and former executive of the J. W. Paxson Co., died recently in Philadelphia. He resigned from the Paxson company as executive vice president to organize his own equipment business from which he retired six years ago.

Albert P. Steigerwald, 63, a retired senior partner, National Pattern Works, Cleveland, died recently. With his brother, he purchased the company 32 years ago after having started with the organization as an apprentice.

David Evans, 84, founder and board chairman of the Chicago Steel Foundry Co., liquidated in 1954 upon his retirement, died recently in Chicago.

Charles P. Wright, 78, who retired in 1945 as vice president, Brake Shoe and Castings Division, American Brake Shoe Co., died recently at Aurora, Ill.

Edwin J. Daehn, 72, retired superintendent, Pelton Steel Casting Co., died recently in Milwaukee. In 1950 he was honored as a 50-year foundry veteran. He retired in 1954.

Bolder T. Elmgren, 72, for 25 years associated with Savannah Machine & Foundry Co., Savannah, Ga., died recently at Thunderbolt, Ga.

Charles S. Redding, 75, chairman of the board of directors and former president, Leeds & Northrup Co., Philadelphia, died Jan. 2.

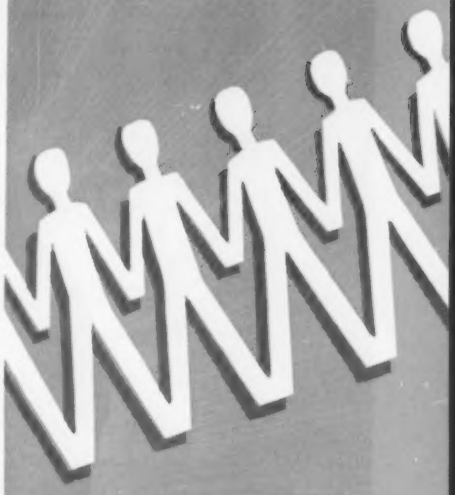
Henry A. Vreeland, 72, president and one of the founders of the North Jersey Foundry Co., Little Falls, N. J., died recently.

ASTM Issues Yearbook

American Society for Testing Materials, 1916 Race St., Philadelphia 3, just has published its 1958 *ASTM Year Book*, which contains a total of 778 pages.

Contents include an alphabetical list of members, a geographic distribution of members, and a list of the numerous committees of the society with personnel.

Circle 647 on Page 53→



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Malleabrasive has the uniformity of metallurgical structure from one lot to the next that has leveled out the cost chart line in many of America's largest foundries and other metal working plants. Not only leveled—but lowered!

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THE GLOBE STEEL ABRASIVE CO.
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Sold by Pangborn Corp., Hagerstown, Md. and by many leading distributors of foundry supplies from coast to coast.

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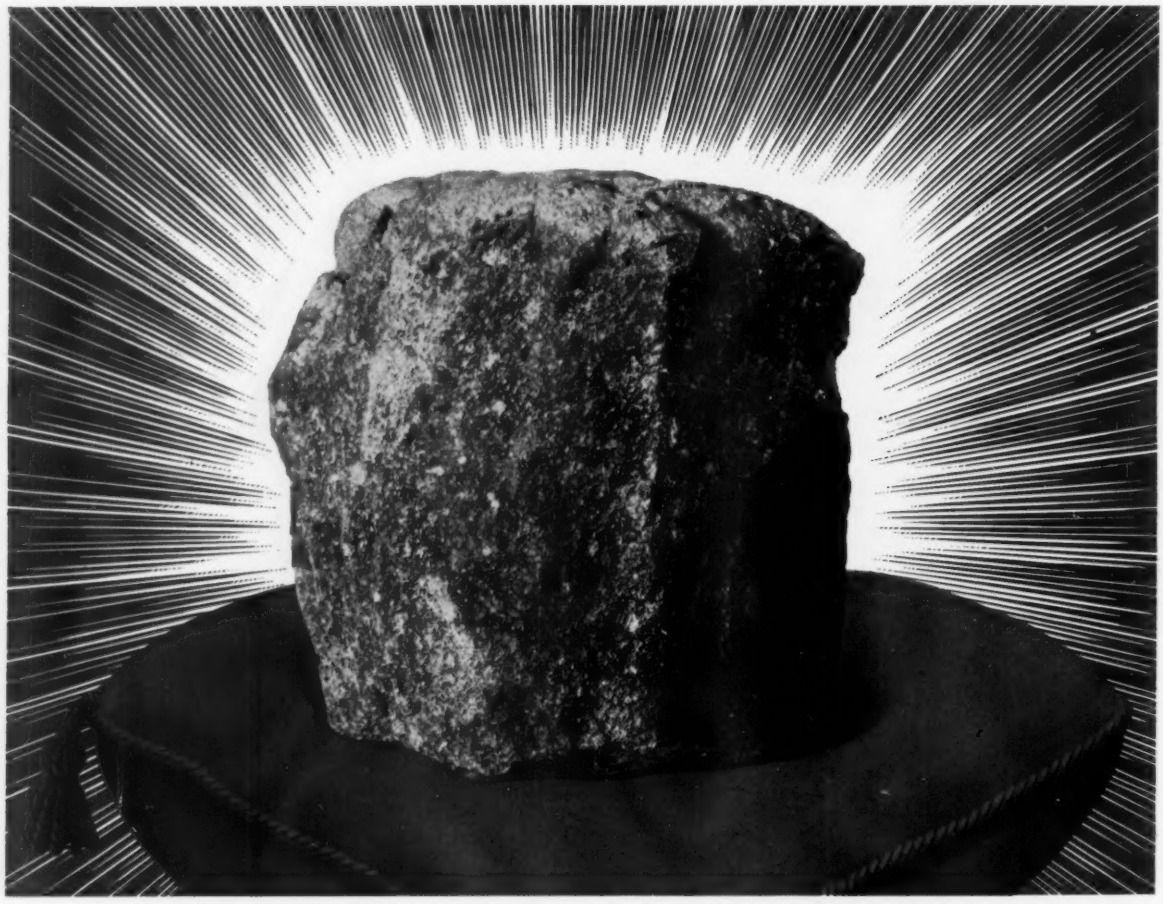

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QUALITY—uniform quality ton after ton after ton—is one of the most important assets you can have in the coke you buy.

At Semet-Solvay, coke quality begins at the mine, where we sample every ton of coal, checking for impurities and measuring the coking qualities. At our coke plants, daily tests in sole-heated furnaces and giant test ovens detect and correct variations that might impair coke quality. Production samples are tested daily for uniformity, strength and proper chemical analysis.

Buying foundry coke from Semet-Solvay offers you other advantages, too: Four strategically located plants for fast, dependable service... five different sizes of coke to meet individual cupola and melting requirements ... the services of metallurgical experts to assist you on foundry problems.

If you are not already using Semet-Solvay foundry coke, why not find out now how it can help you obtain a hotter, cleaner, faster cupola operation? Just contact your nearest Semet-Solvay office or write directly to us for complete details.

Sampling coal at the mine—one step in Semet-Solvay's quality-control program to assure you of better melting coke.

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Circle 648 on Page 53

and by many leading distributors of foundry supplies from coast to coast.

The Sandman Says

By HAROLD E. HENDERSON
H. C. Macauley Foundry Co.
Berkeley, Calif.

"Casting Cellini's Perseus"

● BENVENUTO CELLINI was born Nov. 1, 1500, in Florence, Italy. At 15, quite against his father's wishes, he became apprenticed to a goldsmith, Antonio di Sandro. He was banished for "brawling" on several occasions, and once for killing a man.

The Encyclopedia Britannica states that he was "splendidly gifted and barbarically untamable . . . His amours and hatreds, his passions and delights, his love of the sumptuous and exquisite in art, his self-applause and self-assertion, make his autobiography one of the most singular and fascinating books in existence."

Cellini's *Autobiography* is readily available to anyone who has access to a public library. His *Treatises*, it would seem, has become a collector's item. As mentioned previously, I am indebted to Bob Berry of Sacramento for the loan of his treasured copy, and for permission to make transcriptions therefrom for my own file and that of FOUNDRY.

Perseus — When he explains the actual details of preparing the core and mold for Perseus, and the source and treatment of his sand and clay, his language is quite unlike that used by modern writers, but far more colorful. It can be understood by anyone who has ever tried his hand at the old "cup, saucer, and spoon" job.

"This was what happened to me when I made the Perseus for the most illustrious Duke Cosimo, and which may still be seen on his Excellency's piazza. This, which was a figure of more than five cubits high (a cubit is 18 in.), was . . . modeled in the clay composition, & finished one finger's thickness under actual size; then it was well baked, and the coat of wax modeled over it . . .

"After this it was cast all in one piece. In order to remove the core so that the figure might be lighter, I made through the wax a number of holes in the flanks, shoulders, and legs, and at such places where I required them. The result of this was that the core was kept in its place. Moreover, I put over wax . . . unguents . . . then the two or three coats of clay, next I bound it round with . . . iron . . . and then cast it. This casting was, owing to its size, the most difficult casting ever made. . . .

"Now I have to repeat, then, that the clay figure must have a kind of paste spread over it with a very soft paint brush, & little by little the foil is laid upon it. This paste is made of flour dust, and prepared in the way shoemakers do it, or the mercers, when they make birettas & satchels and such like, and you must mind to make it very fine and thin, and when you have put the foil in little pieces all over it and the whole figure is covered, you can make your gesso molds.

There are divers ways of making the gesso molds. The best, however, that I have come across and that I mostly use myself, is to make as many small pieces as when put together would make a complete man, and that without any undercutting

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GREATER SELECTION...from a complete range of capacities and speeds ...1/8 to 2 tons and 8 to 60 fpm.

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Circle 649 on Page 53

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• FAST
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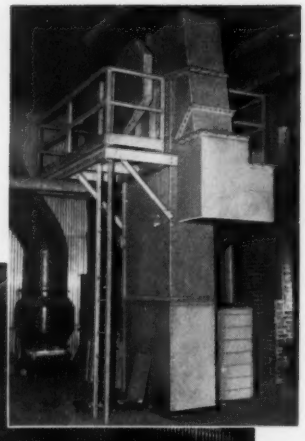

WEBSTER Leak-Proof Apron Conveyor and Bucket Elevator for handling shot and refuse at Lynchburg Foundry, Lynchburg, Va.

Webster conveyors for . . .

SAND, SHOT, MOLDS, CASTINGS, REFUSE, Etc.

WEBSTER conveyor systems for foundries have proved so outstandingly successful because they are ENGINEERED to the specific working conditions and problems of each foundry. There is no obligation in having one of our engineers visit your plant to study and discuss your material handling needs. Write us today.

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BULK MATERIALS HANDLING EQUIPMENT

SINCE WM 1876

Offices in all Principal Cities

—as for instance feet, hands, head.

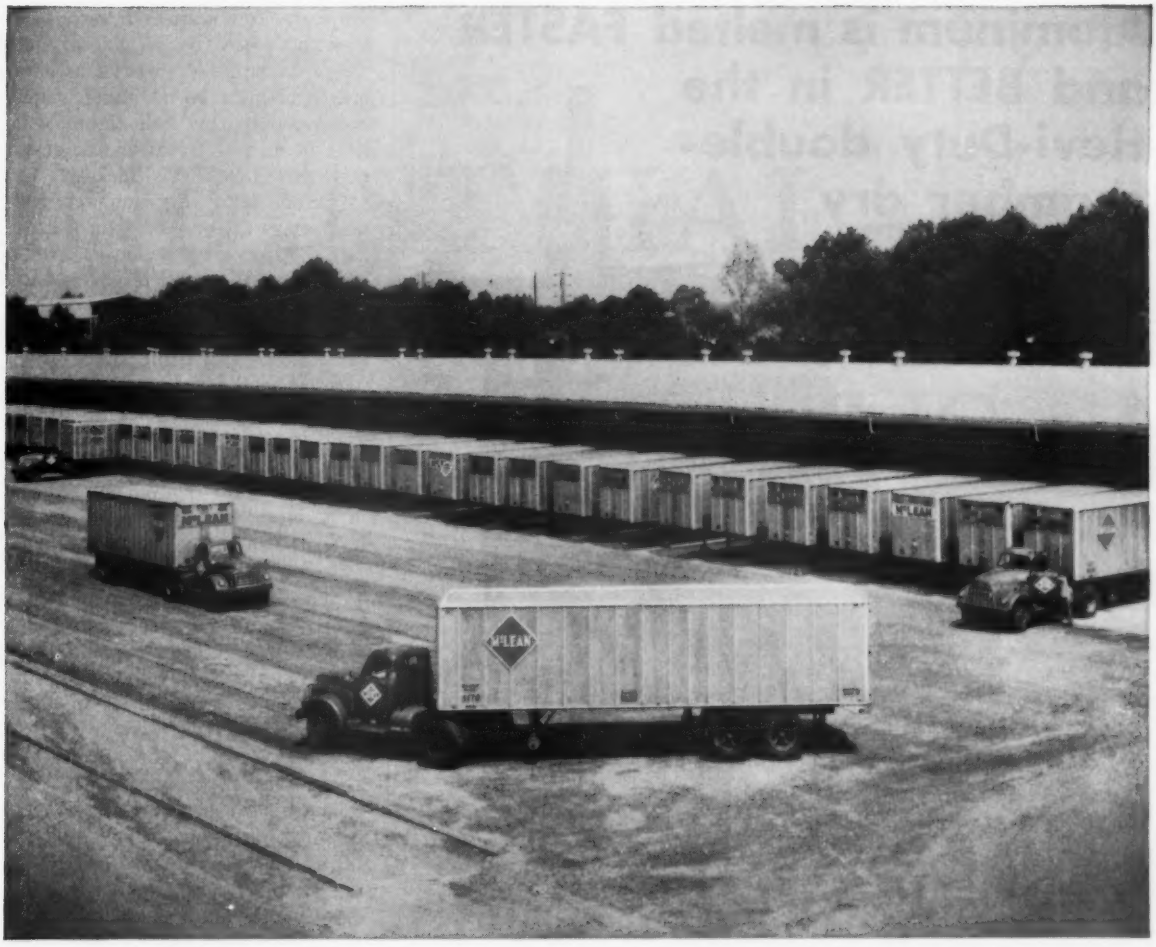
"These small pieces must be made with great care, and while the gesso is moist you fit into each of them an iron wire bent double, and projecting out of the gesso much like a little ring, so as to be capable of holding a thread through it.

"Each time that one of these small pieces is finished it must be tested, and you must see if you get a good impression from it & if the piece relieves. Then if you see that the impression relieves without spoiling a single trifle of your works delicacy, you put the piece in its place again, and with all good master's ingenuity take the next piece off it, leaving no rift whatever in between them such as would scar the work. And so you go on little by little, making the whole series of pieces, observing the undercutting and whatever is demanded for the head, hands, feet, etc.

"In this manner you carefully make your division right down one half of the figure, I mean the half taken lengthwise, coming over the belly and down the breast to the hips, and from the bottom of them to the half of the heels.

"Mind, however, that with these small pieces the figure is not entirely covered, but leave a part of the breasts, a part of the body, a large part of the thighs, and as much of

Cellini's Perseus was cast in bronze in the 16th century. It is in the National Museum in Florence, Italy



FIFTH WHEEL—On large tractor-trailers the "Fifth Wheel" is the link between the cab and the trailers. Many of these are large castings; another example of how the foundry industry contributes to the nation's economy.

TRULINE® KEEPS FOUNDRY PRODUCTS ON THE MOVE

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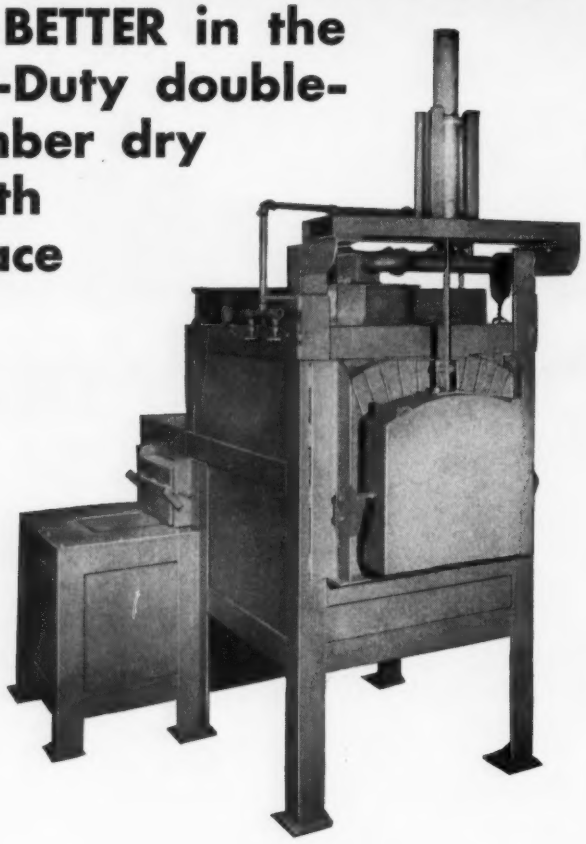

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the legs. You must take care, too, that the pieces be so placed that they may be fitted together as one, but there must be no undercutting because over this half figure will have to be cast a coat of fine gesso more than two fingers thick.

"Before doing this, however, you must mind to cover up with a little clay the iron rings which . . . were . . . put on the small pieces, so that in putting on the coat they do not hinder it from being lifted off. After this you carefully paint over all such parts as shall come in contact with this coat in order that when the gesso is set the coat may easily relieve. When you have tried a piece to see if it will relieve, put it back in its place, and finish the other or back half of the figure in the same way as I bade you do the front.

"You must be very careful when you have finished your mold to take some strong, thick cord and bind the whole figure together from top to bottom, putting a lot of little wedges of wood in order to tighten the rope yet more and prevent the gesso from twisting and buckling. In order not to run any risk of such twisting you keep it thus bound up till all the moisture has gone from the gesso. When you see it quite dry you unwind the cord and open the mold, and that is your first mold."

He Had His Troubles — Cellini devotes a lengthy chapter to the intricate details of his molding procedure, which would be of interest mainly to those concerned with statuary molding, but when he describes the troubles that most foundrymen are heir to, he arouses a universal sympathy.

"Not to be omitted are divers and terrible mishaps that occur from time to time, and often bring to nought all the poor master's pains. So 'tis a wise thing to profit in good time by the experience of others.

"Oftimes we figure casters call in the help of ordnance founders to aid us, but the most terrible misfortunes not infrequently occur owing to their insufficient experience and want of care, and all our labour is lost. Just such a thing very nearly happened to me when I was casting my Perseus, for, calling to aid some of those fellows, I found them so absolutely devoid of sense that in their stupidity they all swore my mold was spoilt, and that there was

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Circle 653 on Page 53

no means of righting it, and all this thanks to the muddle they themselves had made with my metal.

"The statue was more than five cubits high & its pose was a difficult one, for in its left hand it held raised aloft the head of Medusa, in the hair of which was much rich detail of serpents, while the right hand was held behind in a vigorous action, & the left leg was bent. All this variety of limbs made the casting most difficult, and for this reason I was ever so keen to get it good, and also because it would be the first big work I had produced in Italy, my fatherland, & the veritable school of all the arts.

"So I was moved to even greater pains and diligence than I had before used to complete my figure well. So, therefore, I set to making a great number of air vents, and ever so many flowing-in mouths that all diverged from one main one, the which ran down at the back of the figure from the height of the head down to both heels and spreading out a bit at the calves. All these little hints are part of the craft, and in this manner did I practice it when I wrought in France.

"As I had to do almost everything with my own hand, owing to the intense bodily fatigue to which I was subjected, a very violent fever seized upon me. I struggled against it for many hours, but in the end it floored me, and I was brought to bed.

"As I had those different masters of ordnance and statuary founders working for me, I explained to them before I laid me down, exactly the methods I had begun, and how these were now perfectly easy to understand, as more than half the figure was already covered, & the greater part of the difficulties surmounted. All that they had to do was to follow my instructions in detail, and that appeared easy enough, so being utterly incapable of holding out any longer, I flung myself on my couch.

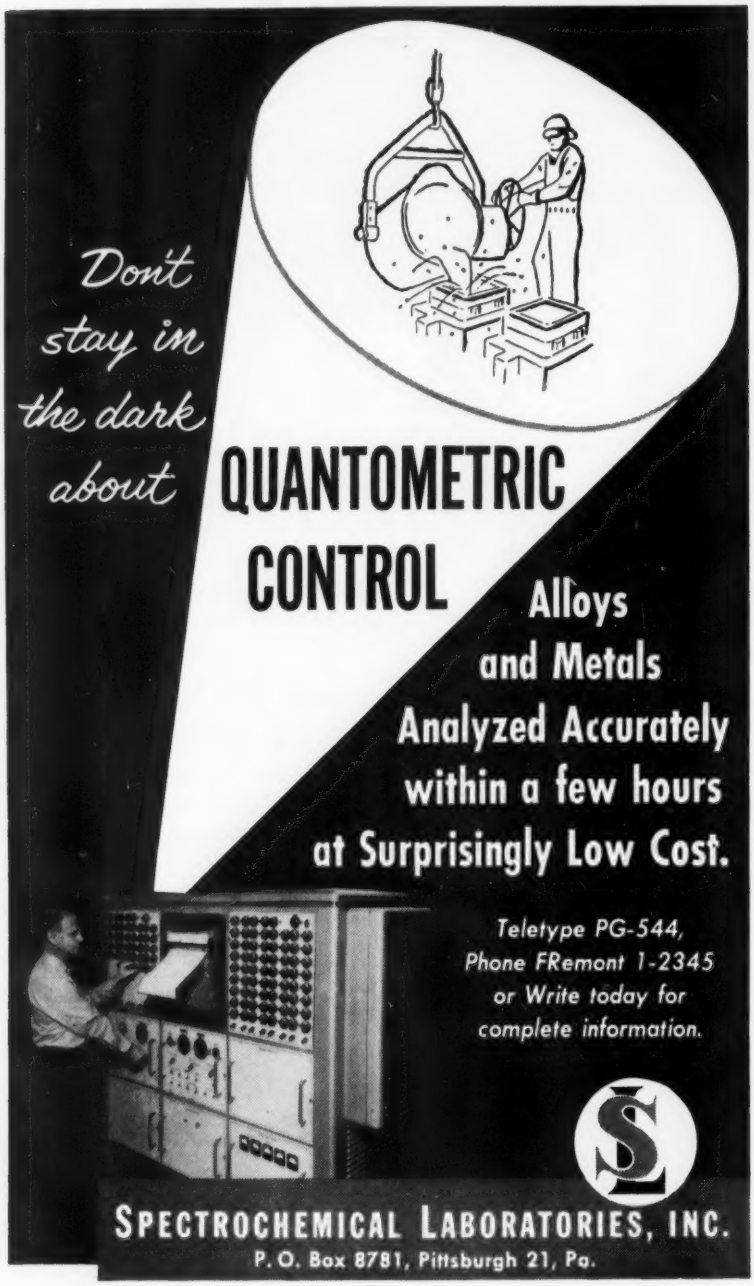
"Meantime the men worked at my furnace which I had so well prepared and in which the bronze was nearly molten and ready for completing. Now they had a good six hours' work still to employ them in order to fulfill all my instructions in proper sequence, because they were not quite skilled in the technique of the craft, and because my methods were different from those they usually employed.

Neglected the Furnace

"Well, instead of doing what they were told they began larking about, neglecting the furnace so that the metal began to curdle, or, as it is called in the craft, to cake—*migliaccio* they call it in their lingo. Nary a one knew a remedy for this blunder, for in a round furnace like this one the action of the fire upon the metal is from above. Were it from below it would be easy enough to heat the curdled metal again; so not one of them knew a remedy.

"Then as I lay there prostrate on my bed with fever, one of them, in whom I had a little more confidence than the rest, came to me, and speaking very gently, said: 'Benvenuto, resign yourself to the worst, the furnace has been ill prepared, a cake has formed on the metal.'

"Then I turned myself toward him and had all the other craftsmen summoned in whom I put any confidence, and asked them if they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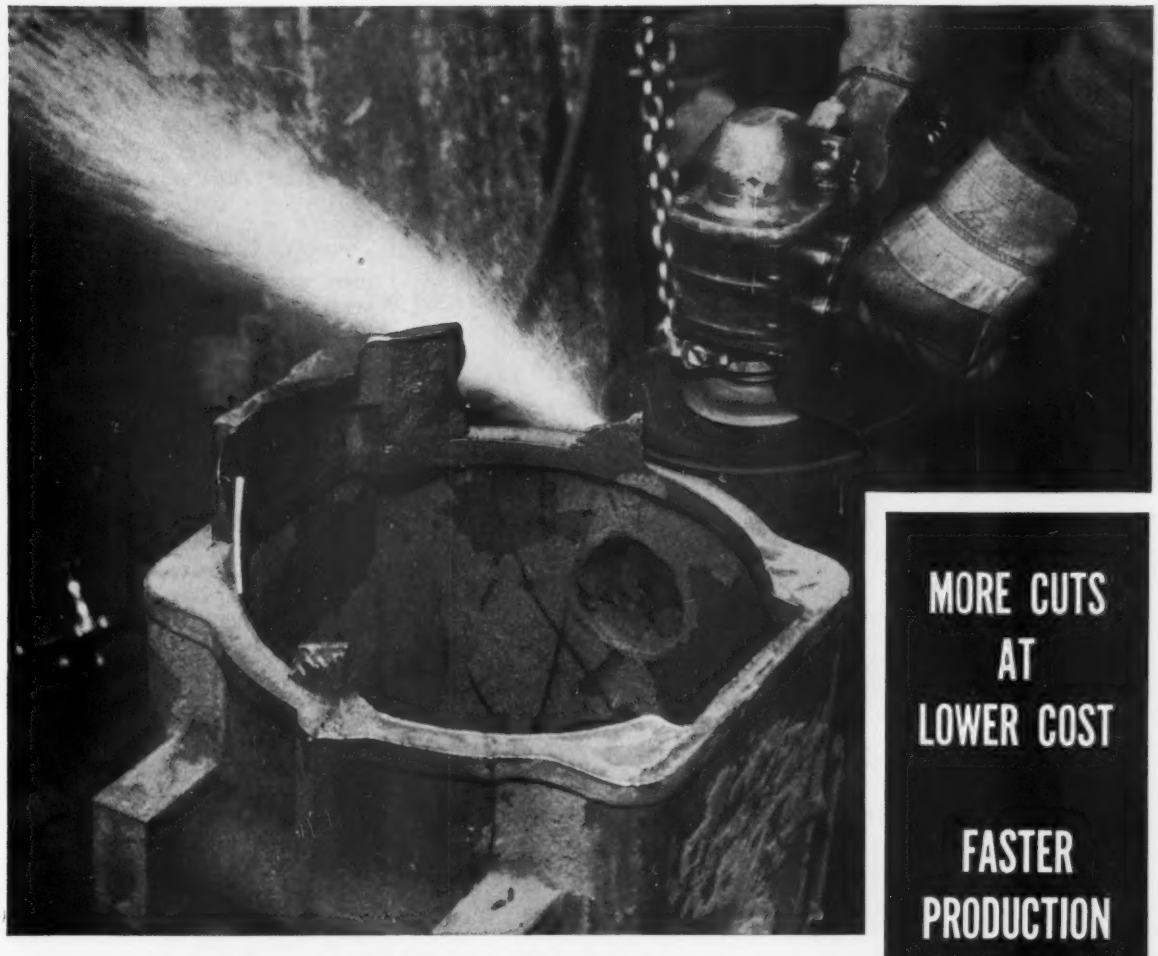

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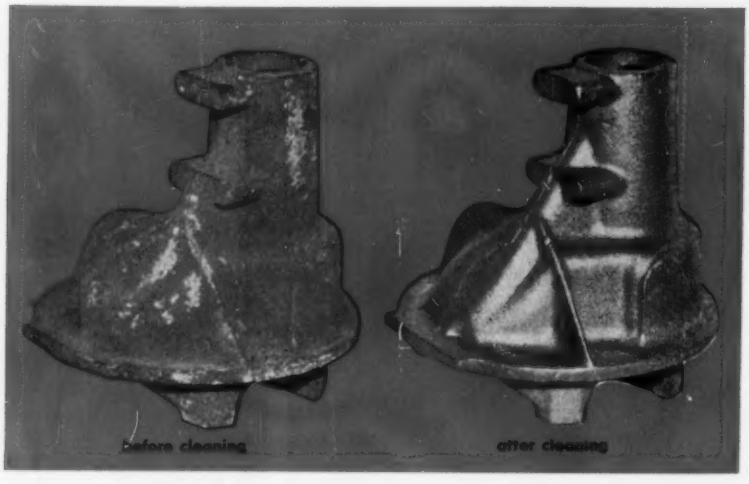
Circle 655 on Page 53

WHEELABRATOR® STEEL SHOT

cuts abrasive costs for

ALL TYPES OF FOUNDRIES



Malleable Foundry Saves $12,000 Annually

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Savings of $1,000.00 a month in abrasive cost are being made at Albion Malleable Iron Co., as a result of switching from a malleable type abrasive to Wheelabrator Steel Shot.

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knew any remedy. Whereupon these precious fine fellows said there was no other remedy but to break up the furnace, & in so doing, as the mold was buried six cubits in the ground, they could not see (they said) how the mold could help being spoiled. For even if I tried to dig up the ground around it, which had been plugged fast, there were so many ingress holes & vents that it was dead certain to be spoiled. That, forsooth, was the only remedy they had!

"Now, gentle reader, picture yourself my state,—I in all my ills and sickness—this new trouble trust upon me—all my honour at stake—why I felt the keenest grief that ever man could imagine! But this was no time to give way to grief. Suddenly, as in a frenzy, my old inborn daring came upon me. It's not a thing one can learn, this! It's in a man's nature! Furiously I leapt from my bed & literally frightened away that grievous fever with the biting words I shouted at those fellows.

" 'Oh you good-for-nothings! Who not only know nought, but have brought to nought all my splendid labours. At least keep your heads on your shoulders now and obey me, for from my knowledge of the craft I can bring to life what you have given up for dead, if only the sickness that is upon me shall not crush out my body's vigour.'

"Thus hounding them on I ran with them into the workshop, and in one go ordered six of them to different duties. First I bade one of them fetch me a load of dry oak that was stacked opposite the house of Capretta, the butcher. And as soon as this came I began throwing it into the furnace several pieces at a time. . . . In bronze furnaces the only woods you use are elder, willow, and pine, for all these are soft woods. In this particular instance, however, I used oak, because I wanted the greatest possible heat, and thus the metal began to move at once.

"To two others I bade with long iron rods to keep poking into the furnace mouths because it was storming with wind, and raining cats and dogs, & wind and rain was blowing into my furnace. By these means I showed them how to stave off wind and rain.

"Two others I set to work to

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J. H. Jewell refutes this one...

Mr. J. H. Jewell, vice president in charge of marketing, Westinghouse Electric Company, says: "*Well-planned industrial advertising is a cause — never just a result—of sales and profits. In today's economy the quality of communications in selling is as important as the quality of production equipment.*"

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quench the fire, because a part of the workshop had caught alight, and several great wooden windows were blazing like the devil, so that I was in terror lest the whole roof should be in flame, so tremendous was the fire.

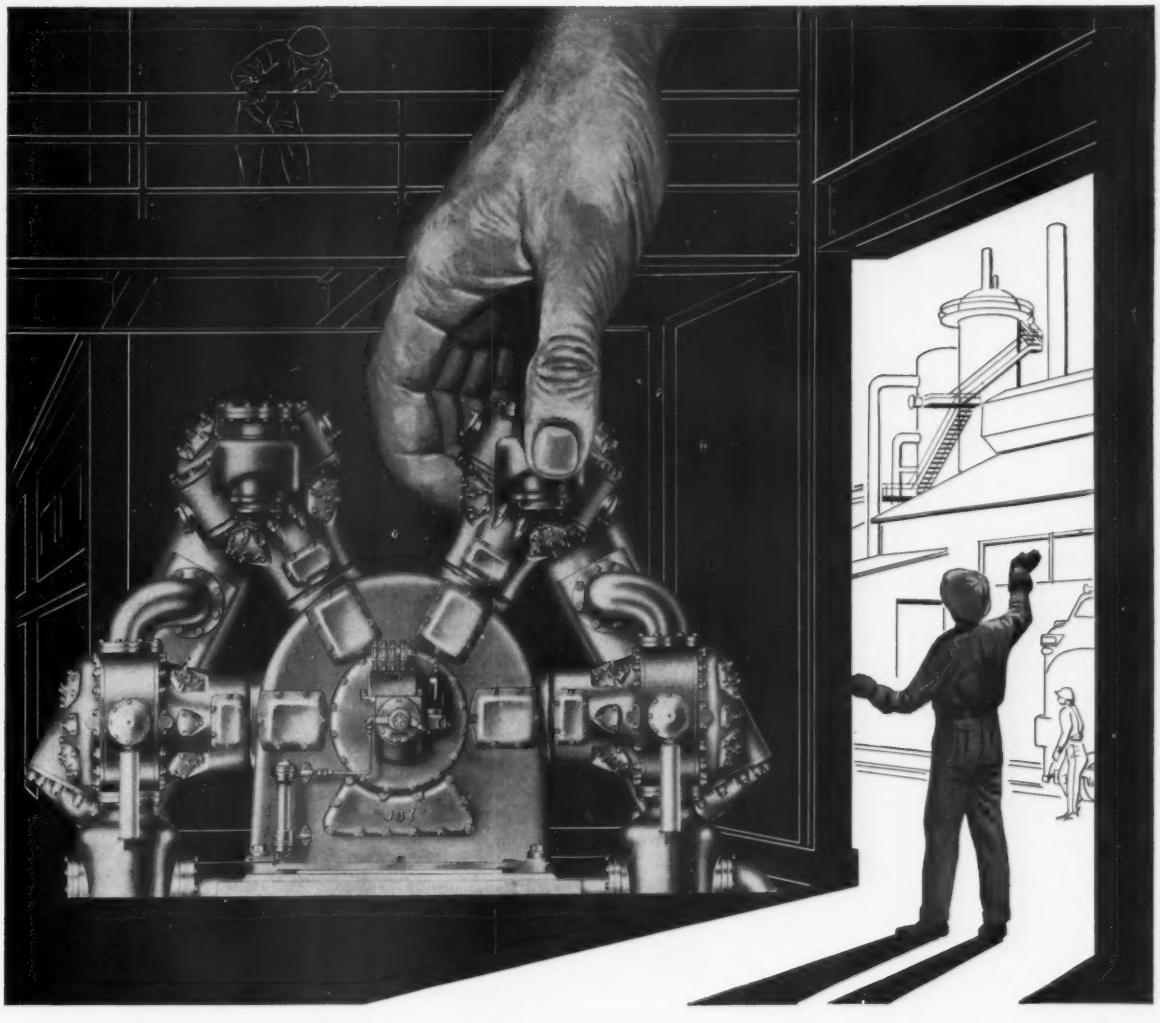
"With the others, and there were plenty of them, I set to work clearing the channels, through which the metal was to run, and to opening all the vent holes. Scarce was this done when, all of a sudden, just as the work was being completed, owing to the terrific heat of the burning oak, the whole cap of the furnace was blown up into the air, and the metal began to well over on all sides: They stood in utter astonishment, all of them,—for they obeyed me fearsomely—to see the caked metal thus again liquified.

Required More Tin

"The strength of the fire, however, had consumed all the tin alloy, so I ordered to be thrown in a thick pig of fine pewter. When I saw this was of no avail, and that by God's grace the metal was already beginning to flow and spread itself on the sides of the furnace, I ordered two others to run into my house and fetch hither all of my pewter plates and dishes, 200 lb weight in all, and threw them in bit by bit.

"Then I made another take iron crooks and strike out first one and then the second of the plugs, which were very hard. Then, as the metal began to flow through the channels, I, little by little, threw the thin pewter plates into it, which, owing to the immense heat, combined with the other pewter, so that my mold was soon filled. Seeing all this mass of metal run in so well without any bubbling or even a single hitch, I concluded that all my vents were doing their work. The amount of metal left over just corresponded exactly to the extra quantity thrown in, so that my mold was completely filled.

"When this was accomplished I gave thanks to God, and turning to the lot of them, said: 'D'ye see how everything has its remedy?' Spite of the pain such was my delight that I felt no more fatigue. The fever just went to the devil, & I sat down to eat and drink with a light heart, together with all the lot of them, and everyone marveled thereat."



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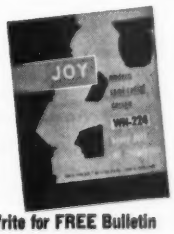

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Circle 659 on Page 53

Technical Reports at

International Foundry Congress

In December and January issues, Mr. Hallett reported on the 1958 International Foundry Congress in Belgium. This month he presents the concluding resumes of technical sessions held at the Congress

By M. M. HALLETT
Managing Director
Chamberlain & Hill Ltd., Walsall, England
European Editor, Foundry

● **COBALT ALLOY**—P. Van Bleyenberghe (Belgium) contributed a paper on a cobalt alloy containing 50 per cent cobalt, 27 per cent chromium, and 23 per cent iron which had been developed for especially severe applications.

When the main requirement was resistance to corrosion, the carbon was kept below 0.5 per cent, but where abrasion resistance was required, the carbon rose to about 2 per cent. The microstructure showed a solid solution containing a relatively small quantity of a eutectic phase when carbon was low, but when carbon was high, large quantities of carbides formed. The alloy was found to be very useful for applications involving exposure to combined abrasion, heat, and attack by sulfurous gases at high temperatures, as in a Dwight-Lloyd sintering machine, and for handling hot slag and for exposure to molten copper, as well as to attack by highly acid liquors containing metal sulfates.

Magnesium Practice — Considerable information was incorporated in a paper by E. F. Emley (England) on recent advances in magnesium casting alloy technology. This rather long paper summarizes the data obtained in 118 other references and for this reason will itself be used for rapid reference by many readers in the future.

Because of its wide scope it is difficult to summarize, but it pays particular attention to the effect of additions of zirconium. Information is provided on creep resistance, on soundness and cracking, on high-temperature properties both for short-term and long-term exposure, on the foundry characteristics, on surface treatments to improve corrosion both normal and in combination with fatigue, and the effect of composition variations and the addition of the less common elements on all these properties. The paper concludes with some practical examples of the use of magnesium alloys and a summary of their advantages.

Bronze Test Bars—One of the reproaches often made by engineers and designers about foundrymen is that little is known about the relationship between the test bars on which the quality of the metal is judged and the mechanical properties of the castings themselves. F. Hudson, D. R. Wood, and J. F. Gregg (England) have set out to provide basic information on copper-base alloys which undoubtedly helps to satisfy this demand.

The alloys concerned are mainly bronzes of the 88-10-2, the 86-7-5-2, and the 85-5-5-5 types. In each alloy, castings were made in step bars providing sections of 4, 2, 1, and ½ in. thickness and also in a wedge-shaped bar tapering in thickness over the same range. From each section the tensile properties, the Izod impact properties, and the microstructure were determined, and the results are presented both in tables and in curves.

As would be expected, mechanical properties deteriorate with increasing section, this deterioration being most marked in the case of the lead-containing alloys in the heaviest section, although even the 88-10-2 alloy showed a marked decrease in properties. The experiments included information on the

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SPAIN IS 1959 CONGRESS SITE

Madrid, Spain, will be the site of the 24th International Foundry Congress to be held this fall. The International Committee of Foundry Technical Associations and the Technical

Administrative Council of the Spanish Institute of Iron and Steel have approved the dates of Oct. 4-10.

The Spanish Institute has started preliminary planning for the meeting and recently published a tentative program. Technical conferences, meetings of the International Foundry Committees, works visits, social functions, and post-congress tours are planned.

Information concerning the meeting is obtainable from the Instituto del Hierro Y del Acero, Villanueva, 13, Madrid, Spain.

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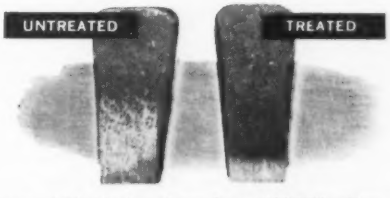

These chill blocks show how "SMZ" alloy reduced chill in a 3.15% carbon, 1.80% silicon iron.

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BRASS and BRONZE FOUNDRY PRACTICE

By HARRY M. ST. JOHN

THIS VOLUME brings together in one place the facts and theories of brass and bronze foundry practice. Much material has been published on these subjects, but for the most part it is scattered through a variety of publications. Now brass founders have available a comprehensive, modern treatment of all aspects of brass foundry theory and practice in one source.

The 250 pages of *Brass and Bronze Foundry Practice* cover the entire range of brass foundry operations. Its 23 chapters discuss alloys, technical and operating procedures, quality control, testing, brass foundry economics, cost control, casting design, patternmaking, foundry layout, and salvage of waste material. The text is supplemented by 85 illustrations which clarify and enlarge on the subject matter. A complete index expands the usefulness of the book as a reference work.

Harry M. St. John, author of *Brass and Bronze Foundry Practice,* is exceptionally qualified to make this contribution to the progress of the thousands of foundries producing brass and bronze castings. Most recently, he was associated with Crane Co., where he was superintendent in charge of brass foundry, brass forging, and die casting of aluminum and zinc. He was awarded the William H. McFadden Gold Medal of AFS in 1947, for his many outstanding contributions to the society and to the foundry industry.

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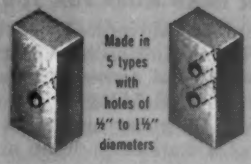

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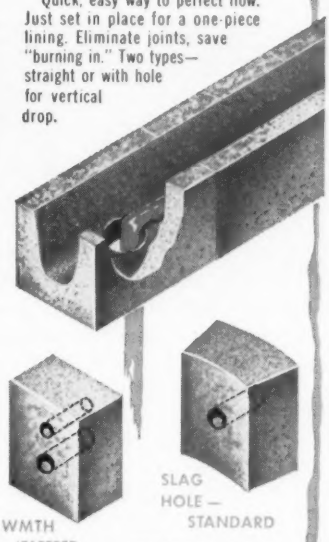

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Circle 662 on Page 53

effect of nickel and demonstrated that the distribution of lead, and therefore the mechanical properties, was substantially improved by 2 per cent nickel. Correlation with separately cast test bars was not good.

The position revealed by this study is contrasted with the known information on copper-base alloys with a short freezing range, such as aluminium bronze and high-tensile brass, both of which are not very sensitive to the effect of section thickness and which therefore show a much higher standard of uniformity throughout a casting. The paper concludes with a suggestion that a copper alloy containing 6-7 per cent tin, 3-4 per cent lead, and $1\frac{1}{2}$-$2\frac{1}{2}$ per cent nickel would be easy to handle in the foundry and would have a high degree of uniformity and lead to substantial savings. (See Pages 86-93 of this issue for details and illustrations.)

Magnetic Testing—A. Karamara (Poland) studied the possibility of applying magnetic testing to the inspection of gray iron castings. After reviewing the earlier literature on magnetic properties and describing his test method, he turned to the connection between residual stresses and magnetic properties. By magnetic measurements of cylindrical specimens bored out by the Sachs method to determine internal stresses, it is demonstrated that a reduction in internal stress leads to a small increase in maximum permeability and to slight differences in the course of the hysteresis loops. This is followed by magnetic tests on bars which were heated to various stress-relieving temperatures. Again the results suggest a slight increase in maximum permeability.

The next series of tests consisted of magnetic tests on specimens loaded in a testing machine both to known tensile and compressive stresses. Again the maximum permeability falls with increasing stress. There is a reduction in the remanence but not appreciably in the coercive force. What was merely a straight-line relationship was noted with compressive stresses, but the relationship with tensile stresses was more complicated. Magnetic tests on fully annealed irons naturally showed major differences in magnetic properties.

Graphite Formation — A. Witt-

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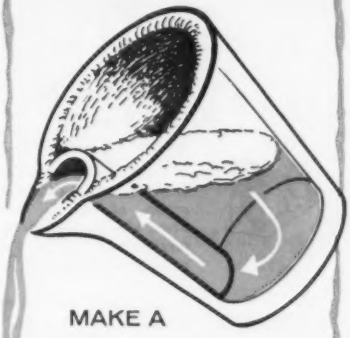

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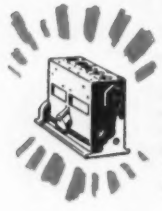

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moser (Germany) considered the various mechanisms by which graphite is formed in cast iron. Five major types of graphite are recognized:

1. Kish graphite formed in the liquid.
2. Normal, evenly distributed flake graphite formed at the eutectic point.
3. Interdendritic fine graphite which may form at the eutectic point or in the solid.
4. Temper carbon which originates on the boundaries of the primary solid solution.
5. Spheroidal graphite which is formed in the central portions of the primary solid solution.

It was pointed out that in the main the flake-graphite types are formed in the liquid and the spheroidal-graphite types in the solid. The paper concluded with some observations on theories that spheroidal graphite forms on the inner surfaces of gas bubbles. The author considers this possibility to be unlikely.

Co-operation—A paper by M. Imberty (France) dealt with co-operation between foundryman and designer. After quoting examples of the benefits of such co-operation, he described the methods followed in France to promote co-operation. Major activities include original choice of the metal, design of the casting, steps taken to insure its soundness and produce it in the cheapest and most efficient way, and steps to maintain dimensions and to apply special methods of inspection. The various forms used on the orders and the method of pattern production conclude this classification.

Deoxidizers for Steel—C. E. Sims and C. W. Briggs (U.S.A.) considered and compared the effects of various deoxidizers in determining the quality of cast steel. The paper is an extremely useful survey of the field based largely on the authors' great experience.

After presentation of a comparison of the relative efficiencies of the main deoxidizers at various temperatures, their effects on the form of the nonmetallic inclusions are dealt with. The well known effects of aluminum, which in moderate amounts is apt to give rise to deleterious inclusions leading to poor ductility and in larger amounts to more satisfactory inclusions, are

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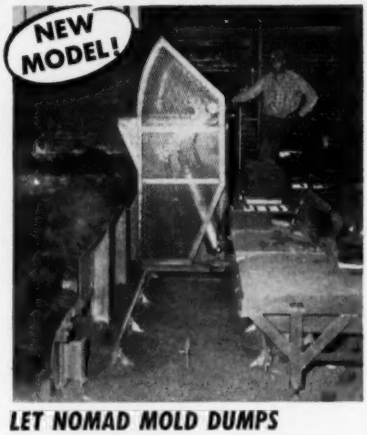

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compared with the effects of titanium and zirconium.

Titanium in large amounts does not cause any reversion to a satisfactory type of inclusion, but zirconium is a safe deoxidizer from this point of view. The rare earth metals (mischmetal) probably are best used as desulfurizers, but selenium and tellurium are not often used. Mixed deoxidizers do not produce any effects different from those of the constituent elements. When steels contain high quantities of nitrogen, it is best neutralized by titanium or zirconium, but the good effect of zirconium on the sulfides indicates that it is a safer material to employ.

Exothermic Compounds — Two long papers dealt with the use of exothermic compounds as applied to feeders on steel castings. That by E. Ney (Belgium) deals specially with blind side-feeders. It is based on a partly mathematical approach and makes the point that the amount of heat generated by the compound does not suffice to raise the temperature of the liquid steel in the head.

The efficiency of the head is due to the increase in temperature of the refractory next to the steel, which retards the rate of heat loss. The proper application of exothermic compounds under these conditions may reduce the amount of feed metal by 40 per cent. It is demonstrated that the known formulas for calculating sizes of feeder heads are confirmed in practice.

A particularly useful part of this paper is the study of the size of the connecting piece between a side-feeder and the casting itself. These results are set out in the form of a simple graph. Reference also is made to the use of side-feeders in conjunction with top-feeders and to the distance through which a side-feeder is able to feed upward.

The other paper, by D. H. Snelson (England), is more empirical and practical in its approach. It makes the same point about the lack of temperature rise in feed metal. It describes a series of tests on the influence of feeding-head diameter and height to achieve maximum soundness on vertically cast, cylindrical steel castings. It also considers the effect of the thickness of the exothermic lining.

Generally speaking, the greater

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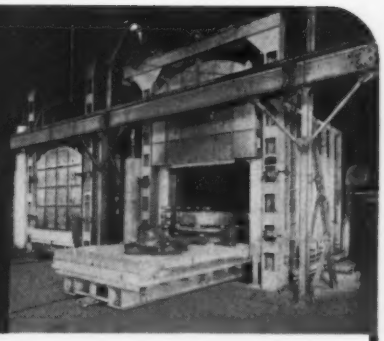

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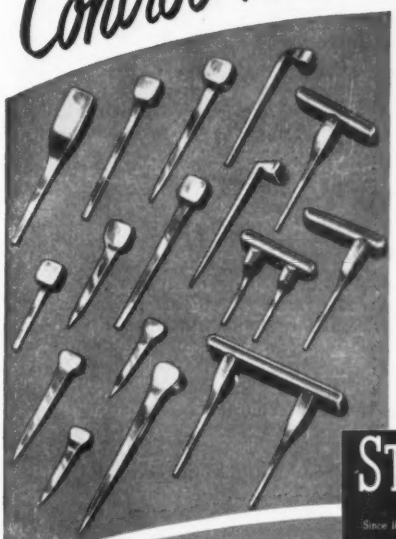

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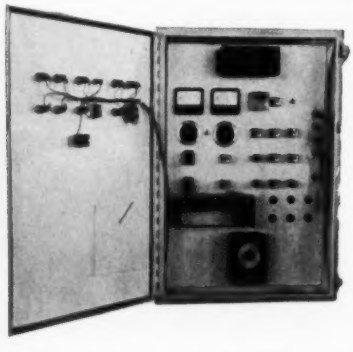

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the diameter of the head, the greater is its efficiency, even though the head is quite shallow. The height should not be less than one half the diameter of the head. Further tests deal with varying lengths of cylinders and the relationship between the minimum diameter of the head and the diameter of long cylinders. Examples then are given of the application of these relatively simple rules to the feeding of more complicated castings and the means by which castings can be broken down into sections for the separate application of efficient heads.

Flow of Aluminum — G. Ohira (Japan) studied the flow of aluminum in green sand molds. Whereas most of the recent work on metal flow has been concerned with the flow through gating systems, the present investigation dealt most closely with the flow within the mold itself. Electrical contact and electrical resistance methods were used to measure the advance of the initial wave of metal, and an electromagnetic oscillograph was used to measure the temperature of the flowing metal, from which the distribution throughout the mold could be calculated. Most of the tests were carried out on pure aluminum but some tests on flow along straight channels were carried out with aluminum silicon alloys with silicon ranging from 1.6 to 18 per cent and on aluminum copper alloys with copper from 5 to 10 per cent.

The paper is profusely illustrated, having no less than 62 figures, many of which are divided into six sections. With much experimental evidence over a wide field, it is difficult to state many general conclusions. It is interesting to note, however, that the effect of the momentum of the flowing metal is one of the most important factors in controlling the flow pattern. The initial flow pattern tends to be irregular, with much agitation and splashing, but it becomes more constant with time, although most small castings are filled before smooth flow conditions are achieved.

Surface Finish—The relationship between surface finish of castings and the molding material employed was studied by P. Schneider (Germany). The experimental apparatus was pneumatic in its operation. It consisted essentially of a suction head with a plane surface which was

applied to the surface of the casting of which roughness was being measured. The smoother the casting, the tighter was the contact between the head and the casting surface—and hence the smaller the amount of air sucked through under constant time and conditions.

Most of the experimental work was performed on a 12 per cent silicon aluminum alloy, but gray iron was used for studies of the additions of coal dust, pitch, wood dust, and dextrine to molding sands and also for some work on the effect of surface tension. The test pieces were stack molded so that the effect of metal pressure could be studied for each experimental condition.

Permeability Affects Roughness

Roughness of the casting was found to be related to permeability of the molding sand. It was decreased by increasing milling time and hardness of ramming. The known good effect of additions of coal dust and pitch was also confirmed. Metal pressure naturally increased surface roughness, but the relationship between moisture content of the sand and roughness varied with metal pressure. Reduction of surface tension, as by adding a high-sulfur content to a white iron, markedly increased roughness.

The relation between mold surface and casting roughness also was studied by J. Szreniawski (Poland), who was particularly concerned with effects of the metal stream on the sand surface. Experiments were designed to cover three different conditions: 1. The impact condition existing at the bottom of the sprue. 2. Conditions of continuous exposure when a metal stream flows over the mold surface, as in the lower surface of a mold. 3. Radiation conditions characteristic of the upper surface of the mold, which is heated solely by radiation from the molten metal as the mold is being filled.

The experiments were carried out in a gray iron on a variety of core, natural, semisynthetic, and synthetic sands. Results were expressed in terms of the life of the surface in seconds before it deteriorated under the experimental conditions. In general, oil-sand cores were more resistant to flow than to impact and least resistant to radiation. Natural sands and semisynthetic sands also

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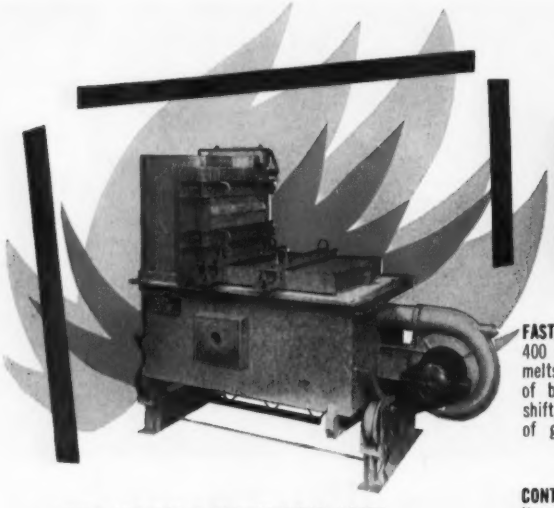

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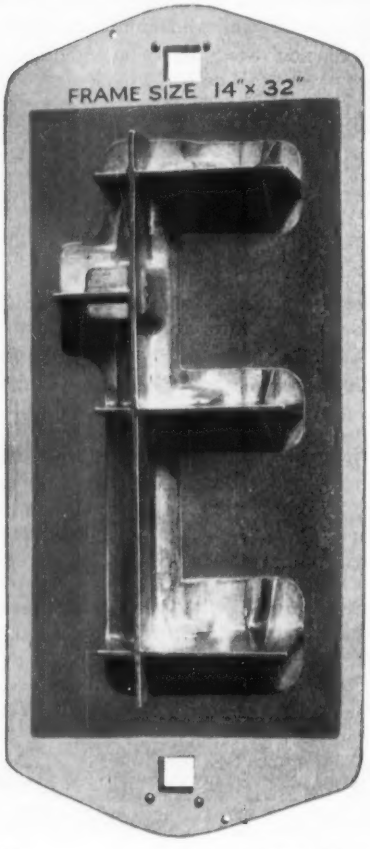

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were more resistant to flow conditions, but more sensitive to impact than to radiation. Synthetic sands were more resistant to radiation than to flow and least resistant to impact.

CO_2 Process—A detailed study of materials used in the CO_2 process was made by D. A. Taylor (England), who reported work carried out at the British Cast Iron Research Association. It involved a complete series of tests on nearly all factors involved in the process, including ramming and gassing the test piece, pressure time and rate of flow of the gas, temperature of the sand, and effect of standing. Studies also were made of sand properties over a range of temperatures.

A large amount of experimental evidence is included in the paper. Findings include the fact that it is possible to dilute CO_2 with air to a very considerable extent. Breakdown of CO_2-process cores was discussed in relation to the temperature of the core during the casting operation. It was noted that the transformation of quartz to cristobalite is greatly accelerated by the presence of the impurities necessarily associated with the process and takes place at temperatures only slightly above 1000° C. This transformation can be eliminated by the introduction of small quantities of alumina into the sand mix.

Alloy Irons—Details of the metallurgical practice and of the compositions of the irons employed in the production of alloy irons usually containing nickel and chromium and molybdenum in the production of high-quality castings for diesel engine parts were set out by B. V. Mahabale (India). It also included information on centrifugally cast cylinder liners.

Basic Linings—An account of a comprehensive series of experiments to study the quality of basic lining materials was reported by B. Sochor (Czechoslovakia). The experimental cupola employed was lined to about 20 in. in a shell of about 34 in. diam. Materials studied included magnesite, chrome-magnesite, and various forms of periclase-forsterite, in the forms both of bricks and ramming materials wherever possible. The only widely used material not studied was dolomite.

Of these materials, magnesite per-

formed best whether as a rammed lining or as bricks. All the materials studied resisted very well the sharp temperature changes. All could be patched with the corresponding materials, although the patching did not resist slags as well as the linings. All showed a lower consumption per ton of iron melted than acid materials, but generally the bricks performed better than the rammed linings.

Dust Collection — R. Goenaga (France) surveyed the various types of equipment available for removing grit and dust from the gases emitted from the top of the cupola stack. The paper discussed the problems involved and described arresters used on both cold and hot blast cupolas. Particular attention was paid to various forms of cyclone separators, especially on hot blast cupolas, but the author also dealt with bag filters, electrostatic separators, and washers.

Water-Cooled Cupolas—C. Longaretti and C. Pensotti (Italy) surveyed the position of water cooling of cupolas. The paper considers the effects of water cooling, as distinct from the use of basic linings, and of hot blast, both of which often are simultaneously applied. The authors believe that the two systems which will find most favor in the future are the one involving trickling down of the cooling water on the external shell and the one in which vertical steel tubes are incorporated in the lining of the melting zone. They are particularly attracted by the latter because an existing cupola can be adapted to it with little modification.

They regard the main advantages of water cooling as lying in the regularity of operation of the cupola with consequent freedom from foundry scrap and from troubles in the cupola itself. It is possible also to drive the cupola much harder without any danger because of the protection which the water cooling gives to the refractories. The ability to undergo long runs, with a consequent reduction in cost, and the improvement in working conditions are other advantages. They consider that the limiting diameter of cupola at which water cooling can be applied is about 24 in. lined. The larger the diameter above this figure, the more beneficial is water cooling.

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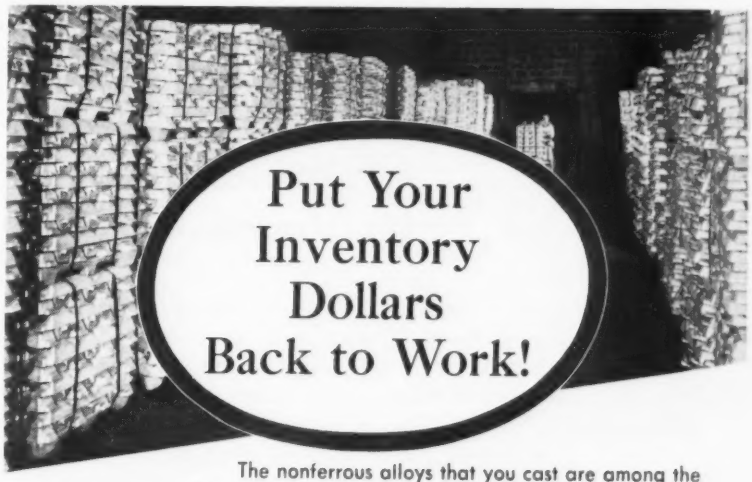

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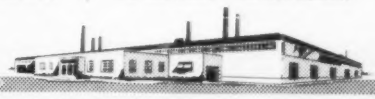

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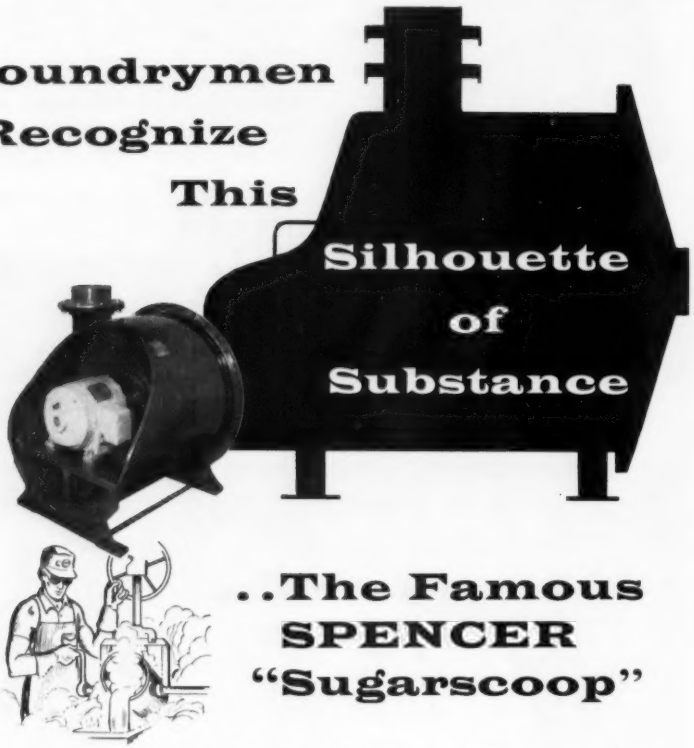
Around the Country

NEWS REPORTS FROM

Chicago . . . Boston . . . Philadelphia

Philadelphia— While up from the year-end holidays, demand for gray iron castings continues spotty. Heavy work lags the most, reflecting particularly a lack of auto die work and restricted inquiry from builders of heavy industrial equipment and machine tools.

Foundrymen Recognize This Silhouette of Substance



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These vital advantages, plus accurate and instantaneous control, have made Spencer blowers — *for half a century* — first choice of leading cupola manufacturers and foundrymen.

Request Catalog 126-A containing complete specifications on Spencer blowers.

ALSO MANUFACTURERS OF PORTABLE VACUUM CLEANERS

SPENCER HARTFORD

The **SPENCER** TURBINE COMPANY

HARTFORD 6, CONNECTICUT

Medium-sized work such as gears, power transmissions and material handling equipment is rather good. Small casting needs are only fair. Gray iron job shops are averaging four days a week, with delivery promises running around two weeks.

Few steel foundries are operating better than four days a week, and where they do exceed that rate it is with reduced working forces. Backlogs average three to four weeks.

Malleable business is holding up well, especially demand for pipe fittings and building hardware. Most shops are running five days a week to maintain stocks at a proper level.

A mild gain is noted among brass and bronze jobbing foundries, although producers are still having difficulty maintaining operations at more than three days a week. Captive shops are relatively more active. This applies especially to those engaged in the production of industrial pumps and valves, meters, and plumbing supplies. However, there is little or no overflow of work from these shops.

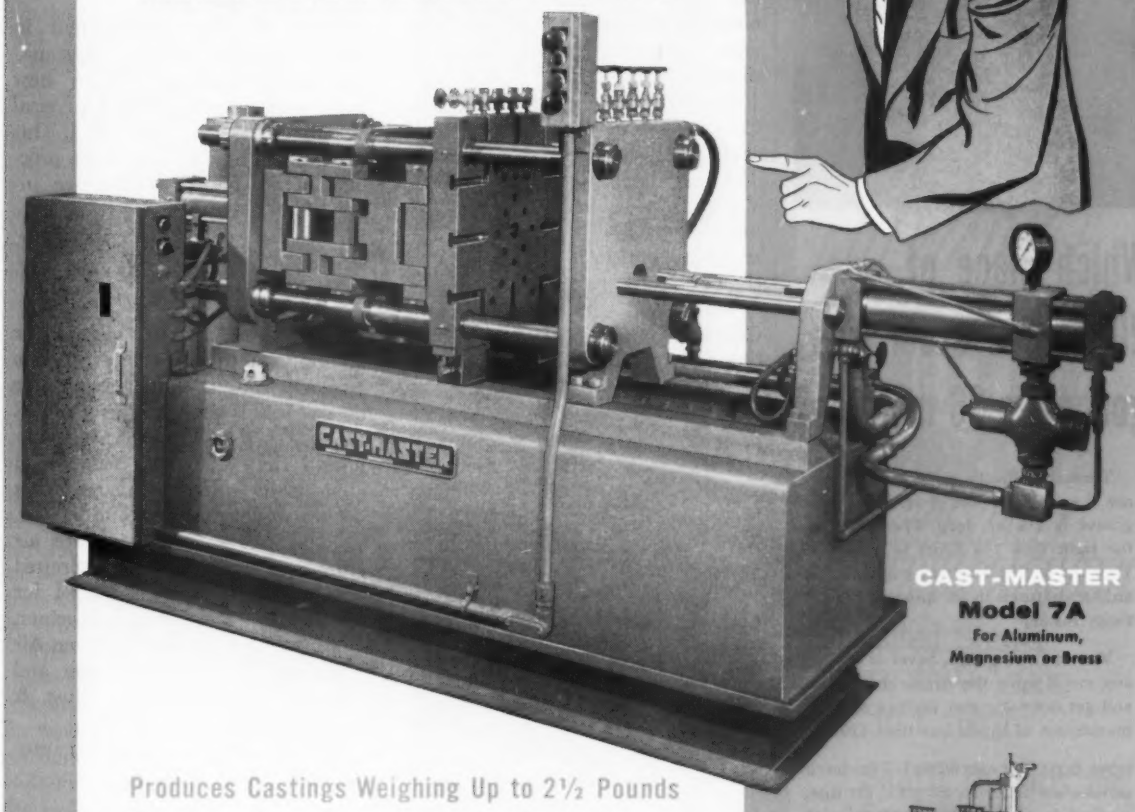
Boston—Foundry operations are more active in New England; additional gray iron and malleable shops will go on five-day week schedule during February and some have moderate backlogs for the first time in nearly a year. In a few instances gray iron shops are close to 80-85 per cent of capacity.

Malleable castings are in slightly better demand than gray iron, and the gradual improvement in bookings during the second half of 1958 is being maintained in most cases, notably with jobbing shops. This also holds for gray iron. Brass and bronze valve and fitting volume is up at both jobbing and captive shops, with inventories a factor. Walworth Co., concentrating nonferrous operations at its new Braintree, Mass., foundry, is operating five days.

First quarter backlog of Whitman

DELIVERY FROM STOCK

Available in Both ZINC and ALUMINUM Models



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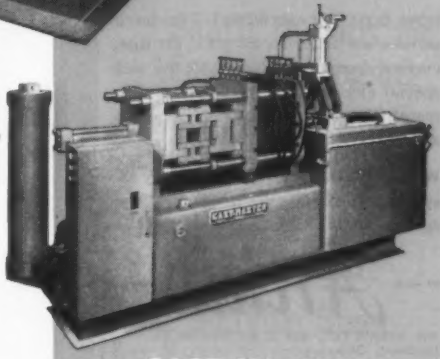
Model 7A
For Aluminum, Magnesium or Brass

Produces Castings Weighing Up to 2½ Pounds

Great news for producers of small castings! Now you can get *quick, direct-from-stock delivery* on two new Cast-Master Die Casting Machines: Model 7Z for Zinc, Tin, Lead — Model 7A for Aluminum, Magnesium, Brass. Both feature the same outstanding design and rugged construction of the larger models now operating in America's leading plants. That means solid steel platens, extra heavy linkage with multiple shear points, and many other details that make possible safer, high-speed production of mirror-smooth, hardware-finish castings.



CAST-MASTER
Model 7Z
For Zinc, Tin and Lead

Send For Brochure Giving Full Details And Specifications

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CAST-MASTER *Inc.*

23901 AURORA ROAD
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Which piece of 20 carbon steel was gouged in 26 minutes?

These two blocks of 20 carbon steel are 7 in. square and 8 in. long. The groove is 2¼ in. deep. The block on the right took 1¾ hours to chip out. The one on the left was gouged with an Arcair torch in 26 minutes — four times faster!

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Send me more information on Arcair Torches and special electrodes.

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MY PROBLEM_____

Circle 676 on Page 53

Foundry Inc., gray iron jobbing shop, is double that of first quarter 1958; operations are on five-day week schedule with melt close to 90 per cent of capacity. Machine tool volume is slow, but it and marine hardware business are improved slightly.

Foundries supplying highway and building construction castings are maintaining increased schedules — five days — and while February normally is a slow month with these units, some are building inventory through March.

Backlog of Belcher Malleable Iron Co., Easton, Mass., one of the oldest shops in the country, points to five-day operations through February. Volume with textile machinery builders, machine tools, and the construction industry has perked up slightly.

For several months orders with Chapman Valve Mfg. Co., Indian Orchard, Mass., have been upward; customers have been carrying low stocks of standard valves and want prompt shipment.

Valve prices softened somewhat last year, but now are firmer. Since June bookings by Chapman Valve have increased slightly each month. Says C. G. Carter, president:

"Customers have been operating with low inventory and are demanding unusually prompt delivery. To maintain a competitive delivery position we found it advisable to move an increased volume of our inventory from rough to semifinished or finished stock. Our low point seems to have been reached in June. While 1958 and 1959 may not be banner years, economies in operations will still be satisfactory as measured by general business conditions."

One new Chapman process, NI-20, for surface hardening of alloy steels, has had good acceptance and several major licensing agreements have been made.

There is slow improvement in textile machinery demand, outstanding being bookings for a new loom winder developed by Universal Winding Co., Providence, R. I. This machine eliminates one entire process in this highly competitive industry and Universal has a large backlog of orders for this new winder.

Chicago—This city's new air pollution control ordinance becomes effective May 1, following passage by a 44 to 0 vote in City Council Dec. 22. The bill had been submitted Dec. 8 after it had gained approval by the council's committees on health and building and zoning.

"This is the most complete air pollution ordinance ever drafted and should serve as a model for other cities," said Kenneth Zweiner, chairman of the mayor's Citizen Air Pollution Control Committee and president of the Harris Trust & Savings Bank.

Among other groups that pro-

Photo by N. A. Baranov, Beardsley & Piper Div.

FEF AT NAVY PIER: Members of the Foundry Educational Foundation's Foundry Industry Committee at University of Illinois, Navy Pier, Chicago, met Nov. 20 to discuss FEF activities at the school. Left to right are F. W. Tresize, Herbert Scobie, Richard Olson, Otto Harer, J. H. Bertrand, Lou Englebaugh, Herman Worrell, George Edwards, Prof. Roy W. Schroeder, Prof. R. B. Perkins, Robert Parker, E. J. Walsh, Jack Schaum, Alexander Zeumer, Arnold Alek, A. C. Smith, Ronald Acker, and Frank G. Steinebach

moted the bill were the Chicago Association of Commerce and Industry, represented by Earl Kribben, vice president, Marshall Field & Co., and the Task Force Advisory Group, headed by Edward C. Logelin, vice president, United States Steel Corp.

The bill calls for regulation of industrial processing as well as fuel burning equipment and in general reduces the tolerable allowances for smoke emission. It would also control fumes from industry, including foundries, smelters, steel plants, and similar companies.

FOUNDRY for April, 1958, p. 228, reviewed sections of the proposed ordinance dealing with cupolas, air furnaces, heating and reheating furnaces. Another article on the ordinance appeared in the March issue of FOUNDRY, p. 186.

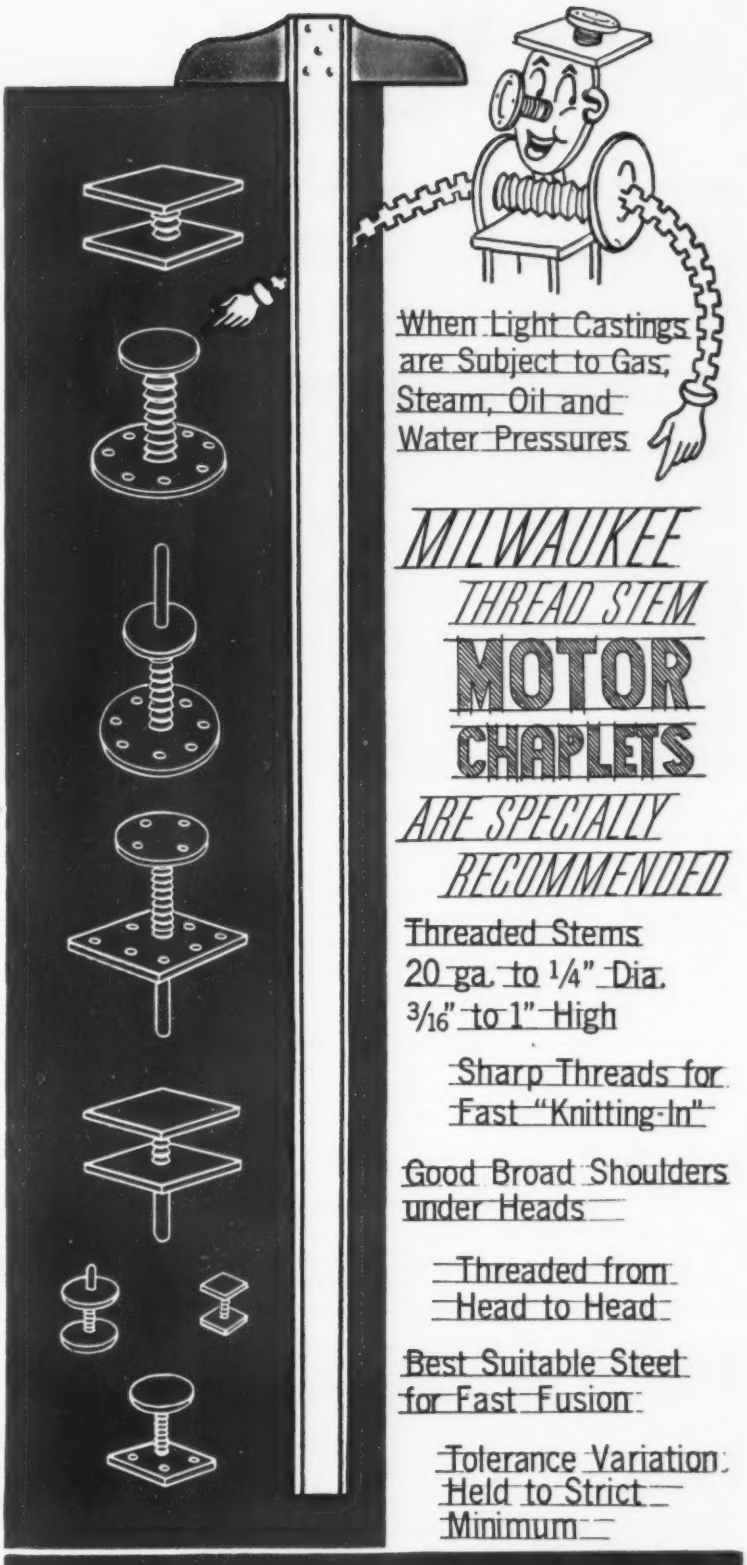
Carriers Voiced Objection

One of the few objections voiced at the public hearing prior to council action was from the Lake Carriers Association of Cleveland. It felt the requirements might deter lake ships from docking at Chicago. It was pointed out, however, that the bill will permit lake freighters to belch heavy smoke for a short time when maneuvering at the docks or in the river.

The ordinance, which provides reasonable grace periods to effect compliance, provides heavier fines for repeated offenders. The law now provides a fine of $10 to $200 for a violation regardless of how often the violation occurs. The bill makes repeat offenders subject to a fine of $50 to $200 if the offenses occur within 90 days.

The proposed ordinance for the most part is based on recommendations made by Armour Research Foundation of Illinois Institute of Technology after years of study. Dr. Haldon A. Leedy, director of the Foundation, said recently:

"In its present form the proposed ordinance is technically and economically sound. It is as effective as can be expected from our present level of knowledge in air pollution, but one of its best features is the emphasis on what isn't known. The provision for further research and study on all the ramifications of air pollution lays the groundwork for further improvement in the basic ordinance as we go along."


When Light Castings are Subject to Gas, Steam, Oil and Water Pressures
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MOTOR
CHAPLETS
ARE SPECIALLY RECOMMENDED
Threaded Stems 20 ga. to 1/4" Dia. 3/16" to 1" High
Sharp Threads for Fast "Knitting-In"
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Tolerance Variation Held to Strict Minimum
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Circle 677 on Page 53

The Shakeout

Automated Barrel Cleaning Cuts Labor Costs

A POLYURETHANE type synthetic rubber solid industrial tire developed by the Research Div., Goodyear Tire & Rubber Co., Akron, Ohio, is said to have up to four times the wearing qualities of conventional industrial tires. They are designed for use on pallet

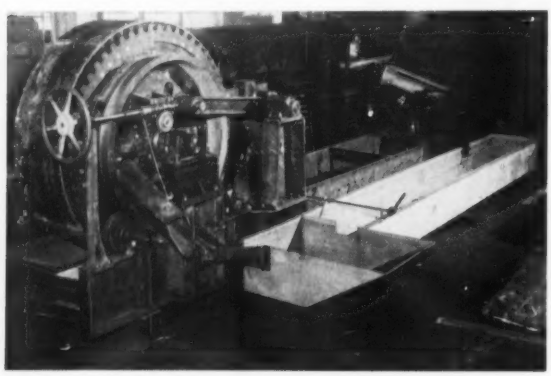
roller wheels and steer wheels and currently are being produced on a pilot-plant scale.

The new material reportedly has extremely high resistance to cutting and chipping as well as to oil, weather, and abrasion. High load bearing is another feature. Use of the new tires also is claimed to reduce floor maintenance costs and to protect equipment and loads against damaging shock because of their cushioning action.

For More Details Circle No. 498—Page 53

Reclamation Mill Saves Waste Metal

RECLAMATION of waste metal in foundry slag, skimmings, and sweepings produces a concentrate which reduces costs of handling and shipping bulk material to the smelter. In some instances, the concentrate even can be used as remelt. The amount of metal reclaimed runs from 10 per cent to as much as 50 per cent.



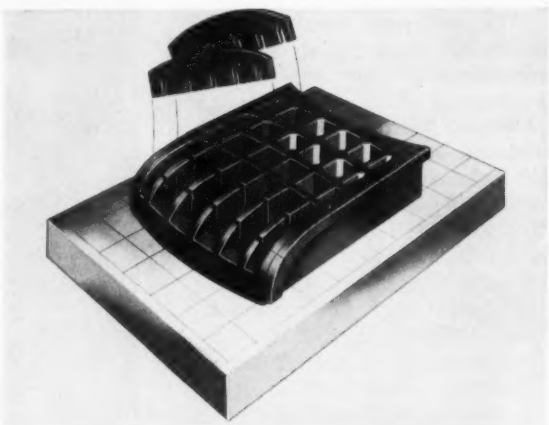
Mills manufactured by Dreisbach Engineering Corp., Yonkers, N. Y., are available in four sizes with a feed range from 400 to 8000 lb of material per hour. Reclamation cost is about 1½ cents per pound, and cost of maintaining a mill reportedly is very low. The history of a valve foundry illustrates the economies possible: This company poured 468,186 lb of metal in two months and reclaimed 18,642 lb.

The No. 5 mill shown here handles 955 lb per hour and can be operated either manually or completely automatically. This model has two settling tanks for manual removal of tailings. The charging hopper is lowered for discharge of the metal concentrates. Dry milling also is available.

For More Details Circle No. 499—Page 53

Master Models Are Made Faster and Cheaper

NEW METHOD of making master models is said to reduce time and cost required by one-third. Developed by Kish Industries Inc., Lansing, Mich., the process uses a liquid epoxy, called No. 44 epoxy resin, and prepoured, fully cured boards, called KiPlaBoard No. 44, which are made from the formulated epoxy. The formulated plastic is said to combine the physicals of



epoxy with workability similar to that of such a wood as mahogany.

The boarding material is made in 2 x 6-ft sections of varying thicknesses. From the draft, templates are cut from the board and bonded together with the resin to reproduce the desired lines. The board is bonded together to fit the egg-crate construction created by the plastic templates and inserted in place. Female contour metal templates then are set and "shot" in place with the resin. After the epoxy has polymerized, the templates are removed, and the model is surfaced down to the template line as shown here.

For More Details Circle No. 500—Page 53

for plates

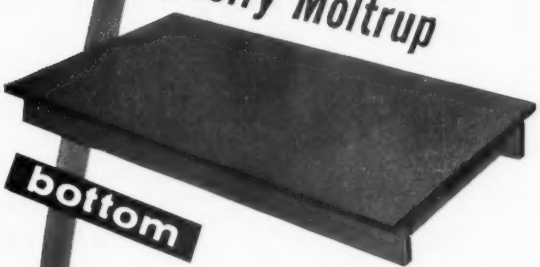
... that stay flat

pattern

... and last longer

core

... specify Moltrup



bottom

For accurate casting results specify Moltrup Plates. They are long-lasting and stay flat—because Moltrup employs a special flattening process designed to permanently eliminate buckling or bending. Consequently your investment goes further and your profit margin increases. Plates are made to your specifications. Write or phone us for complete information.

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F-2

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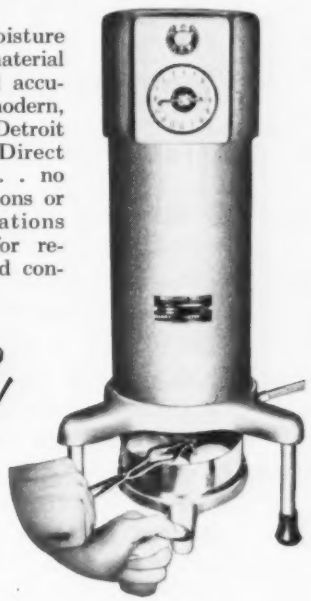
with the

DIETERT-DETROIT MOISTURE TELLER

Determine the moisture content of any material quickly, easily and accurately with the modern, low priced Dietert-Detroit Moisture Teller. Direct testing method . . . no chemicals, calibrations or involved computations necessary. Ideal for research, analysis and control work.



New Catalog Ready Now!

Illustrates and describes complete line of Dietert-Detroit Moisture Testing Equipment, including Moisture Tellers, Speed Ovens, Speed Desiccators and accessory items. Moisture Teller No. 276 illustrated at right.

See How Dietert-Detroit Moisture Tellers Speed up Testing Time!

Sample	Sample Size Grams	Temperature Degs. F.	Drying Time Minutes
Sand	50	250	3
Paper	50	250	15
Salt	20	260	6
Soap	10	250	9
Color Pigment	10	212	12
Liquid Wax	5	250	15
Yeast	50	280	15
Licorice Extract	5	220	30
Pig Meal	25	250	25
Mash Pellets	25	255	25
Pulverized Oats	25	255	10
Glass Powder	10	250	20
Flour	25	250	12
Textile Fibers	20	300	15
Wood Pulp	25	250	7

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A GRADE FOR EVERY FOUNDRY REQUIREMENT

MOROC ❶ High-strength binder for ferrous and nonferrous molds and ladle linings.

MOROC ❷ For medium-sized and large molds and cores. Has high-strength and good collapsibility.

MOROC ❸ High-strength, high-collapsibility binder for ferrous and nonferrous cores, can be used in core blowing equipment.

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Available in tank cars, tank trucks, 55-gal. drums, 5-gal. cans.

MOROC CORE PASTE—For joining sections of silicate bonded cores. Fast drying, gives a high-strength bond in minimum time. Supplied in 55-gal. drums, 5-gal. pails.

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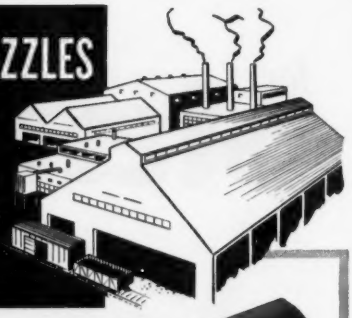
Circle 680 on Page 53

SPRAY NOZZLES

to improve general foundry operations *and increase* product quality



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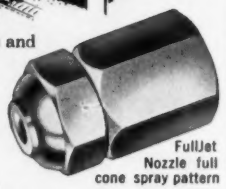

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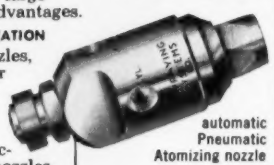

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For complete information write for Catalog 24... forty-eight pages of complete nozzle data.

Circle 681 on Page 53

NON-FERROUS FOUNDRY METALLURGY

By A. J. Murphy

Covers the general principles unifying foundry techniques of all industrial nonferrous metals in relation to metals in the liquid state to the process of solidification and to the factors influencing properties of casting. Other materials include the part played by gas dissolved in liquid metals, its control and its influence on cast products; factors influencing the grain size of castings, and mechanical properties of castings as complete components compared with the properties in conventional test samples.

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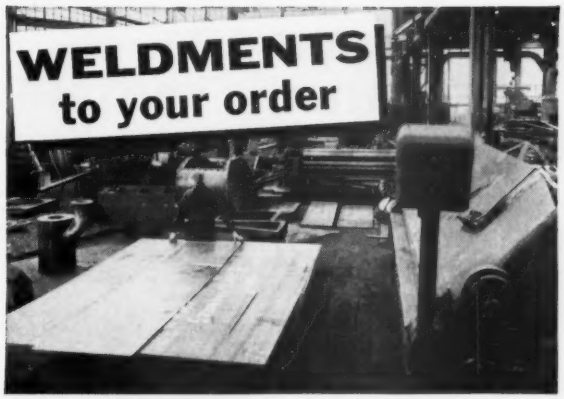
MECHANIZATION

Circle 682 on Page 53



Complete facilities to produce all types of welded constructions . . . carbon or stainless steel and aluminum from 1/16″ to 4″ thick . . . to your specifications.

This includes tanks, chutes, hoppers, machine bases, stacks, breechings, angle rings, special cars, buckets, and other equipment.

Call or write for estimate. Let us show you how we can save you time and money.

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Circle 683 on Page 53

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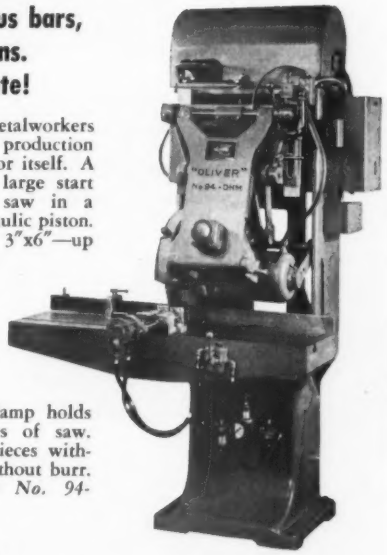
HYDRAULIC CUT-OFF SAW

to cut nonferrous bars, tubing, extrusions. Fast and accurate!



Nationally known metalworkers find this hydraulic production machine soon pays for itself. A light touch on the large start button moves the saw in a straight line by hydraulic piston. A 14-inch saw cuts 3″x6″—up to 25 strokes a minute. An 18-inch saw cuts 5″x6″—up to 20 strokes a minute. Heavy table has micrometer stop to gauge cuts from 1/16″ to 20½″ long. Air clamp holds work on both sides of saw. Cuts thousands of pieces without variation and without burr. *Write for Bulletin No. 94-DHM.*

OLIVER MACHINERY COMPANY
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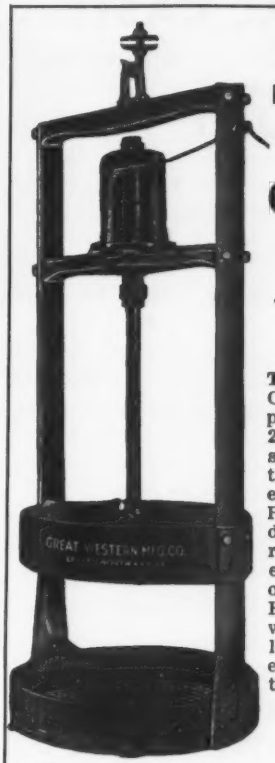
Circle 684 on Page 53



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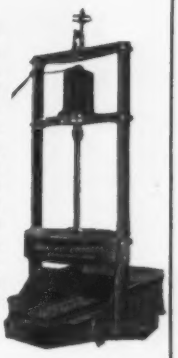
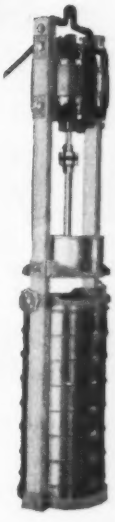
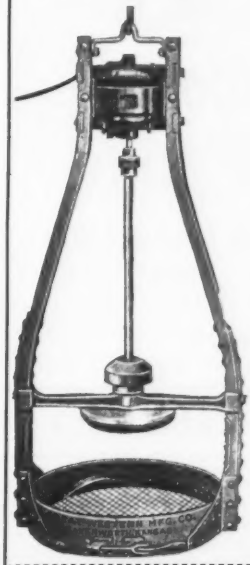


TYPE "CS". Complete price $395.00. 24″ square sieve. A continuous operation sieve. Requires no dumping, as refuse is ejected off to one side. Height 4′10″, weight 295 lbs., ⅓ H.P. enclosed motor.

TYPE "CR". Complete price $385.00. 24″ dia. round sieve. Sifts, fluffs, mixes, aerates sand. Height 4′6″, weight 250 lbs., ⅓ H.P. enclosed motor.



TYPE "HL". Price $285.00 complete, less sieves. Laboratory model especially designed for laboratory sand control, fitted with 1/6 H.P. enclosed motor.



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TYPE "V". Price, 20″ Sieve, $300.00. Does the work of 10 men. Screens sand, Fine, Medium, and Coarse. 20″ dia. sieve with special clamp for 5-second changes. Height 4′6″, weight 100 lbs., fully-enclosed 1/6 H.P. motor. Also available in Giant V-5 with 36″ sieve for triple capacity . . . Price $545.00.

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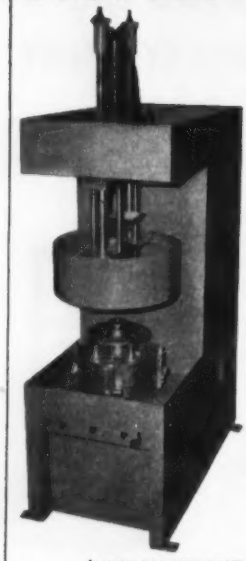
Circle 685 on Page 53

CENTRIFUGAL CASTING MACHINES ... WITH STANDARD PARTS AND EQUIPMENT CAN BE ... CUSTOM BUILT



We make machines capable of producing castings weighing MANY TONS as well as machines to produce castings weighing a FEW OUNCES.

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Some machines are designed for long-run repetitive production, while other special machines are most suitable for short runs of varying sizes and types of castings.

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WE FURNISH INFORMATION ON HOW TO MAKE CENTRIFUGAL CASTINGS

INQUIRIES INVITED

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Circle 686 on Page 53

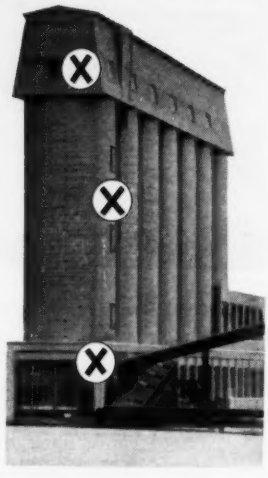
X MARKS THE CRITICAL SPOTS!

It takes more than muscles to build a storage bin

Before the physical work of building a bin begins, we must know the problems involved at the *Three Critical Points.*

- X What is the loading problem?
- X What are the characteristics of the material to be stored ... and its "flowability"?
- X What is the volume and rate of discharge?

When planning your next storage bin, may we sit in on the very early stages of planning?



NEFF & FRY COMPANY
214 Elm St., Camden, Ohio

N&F

You can always spot a Neff & Fry Bin by the shape of the stave!

Circle 688 on Page 53

EMPIRE*

"THAT GOOD" FOUNDRY COKE

DEBARDELEBEN COAL CORPORATION
2201 First Ave., North • Birmingham 3, Ala.
Phone: ALpine 1-9135
*Reg. U.S. Pat. Off.

Circle 687 on Page 53

MURPHY PISTOL SPRAYER

Forces blackening into pores and pockets of molds. Sprays Silica wash, oil, or water equally well. Use it also to sand blast or as a blow gun.

Standard of the foundry field for over 50 years. Stocked by leading foundry supply houses. Guaranteed by . . .

JAMCO

JAS. A. MURPHY & CO., INC.
1425 EAST HIGH STREET, HAMILTON, OHIO

Circle 689 on Page 53

EUCLID CRANES

Some of the Many Foundries utilizing Euclid Cranes . . .

Crucible Steel Casting Co.
Burnside Steel Casting Co.
Allyne-Ryan Foundry Co.
Sterling Foundry
National Malleable Steel Casting
Columbiana Foundry
M. B. M. Foundry, Inc.
Kasper Foundry
Duplex Foundry
Larson Foundry
Alcoa Foundry
Interlake Iron Corp.
Texas Electric Steel Casting Co.

This 10-ton, 3 motor EUCLID CRANE is in operation at TEXAS ELECTRIC STEEL CASTING COMPANY

are FAVORITES in FOUNDRIES

EUCLID thinks, designs and builds foundry cranes with dust proof mechanisms that withstand abrasive, corrosive conditions.

Push-button, rope pendant floor control and overhead cab operation incorporate the latest design improvements for precise load control at all times.

EUCLID SERIES H HOISTS are available in capacities up to 10 tons.

Write for Latest Literature

THE EUCLID CRANE & HOIST CO.
1360 CHARDON ROAD • CLEVELAND 17, OHIO

Circle 690 on Page 53

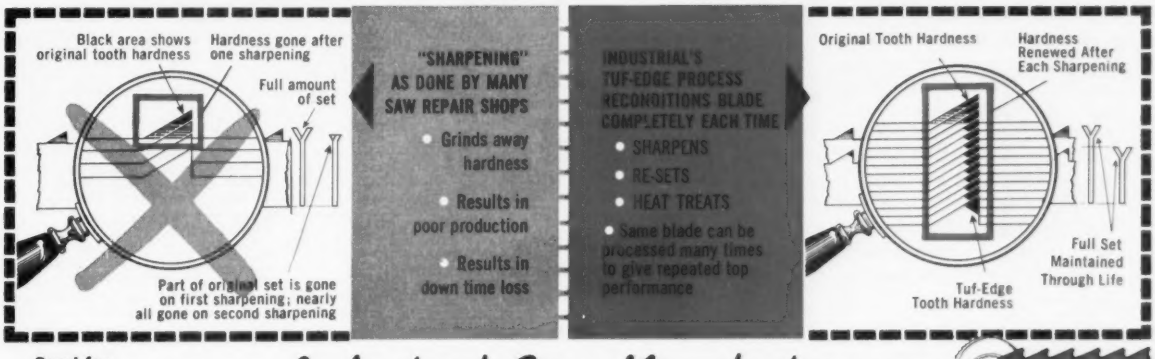
Non-ferrous foundries spend too much money on bandsaw blades!

In 1946 Industrial Saw Manufacturing developed a complete bandsaw blade re-conditioning service that reduces blade expense and produces more castings per hour from your bandsaw machines.

THIS SERVICE IS IMPORTANT TO YOU IF:

1. You are throwing away dull blades
2. You are having blades sharpened

'SHARPENING' ONLY IS NOT ENOUGH


Black area shows original tooth hardness
Hardness gone after one sharpening
Full amount of set
Part of original set is gone on first sharpening; nearly all gone on second sharpening
"SHARPENING" AS DONE BY MANY SAW REPAIR SHOPS
• Grinds away hardness
• Results in poor production
• Results in down time loss
INDUSTRIAL'S TUF-EDGE PROCESS RECONDITIONS BLADE COMPLETELY EACH TIME
• SHARPENS
• RE-SETS
• HEAT TREATS
• Same blade can be processed many times to give repeated top performance
Original Tooth Hardness
Hardness Renewed After Each Sharpening
Full Set Maintained Through Life
Tuf-Edge Tooth Hardness

Send for complete catalog and free trial Bandsaw blade.

Industrial Saw Manufacturing

304-8 EAST OAKS AVENUE • COMPTON 4, CALIFORNIA

TUF-EDGE BANDSAWS

Circle 691 on Page 53

FOR BETTER CASTINGS...

UNIVERSAL refractory gating components

Determine proper gating faster, eliminate slag inclusions, stop rejects, reduce cleaning room time, and lower production costs. UNIVERSAL *refractory* gating components will help you do this, and at less cost than producing your own from sand. Send specifications for price and delivery quotations, or call MA 6-4912

WRITE TODAY FOR CATALOG LISTING SPECIFICATIONS OF STANDARD GATING COMPONENTS

UNIVERSAL CLAY PRODUCTS CO.

1515 EAST FIRST ST. • SANDUSKY, OHIO

Circle 692 on Page 53

TEST FOR C CARBON IN JUST 2 MINUTES

with a DIETERT-DETROIT carbon determinator

Why bother with tedious, time consuming laboratory routines when a Dietert-Detroit Carbon Determinator provides a completely accurate analysis of carbon content in just two minutes. Easy, too . . . no involved computations! Samples may be borings, mill chips, crushed samples, pellets, etc.

Sulfur Determinators also available for performing fast, accurate tests on wide range of materials.

Excellent performance record with:

IRON / STEEL / PETROLEUM CATALYSTS
STAINLESS ALLOYS / ORGANIC CHEMICALS
FOUNDRY SANDS

Send for free catalog!

Illustrates and describes both Carbon and Sulfur Determinators and accessory equipment.

HARRY W. DIETERT CO. CONTROL EQUIPMENT

9330 ROSELAWN DETROIT 4, MICH.

Send me your latest Carbon-Sulfur Determinator Catalog.

NAME_____

COMPANY_____

ADDRESS_____

CITY_____ STATE_____

Circle 693 on Page 53

CLASSIFIED ADVERTISING

Help Wanted

BLOOMING MILL

FOREMAN

For expanding basic steel producer and fabricator in Chicago. Experience in the supervision of Blooming Mill operation is essential. Excellent potential for advancement in our expanding facilities. Liberal employee benefit program. In reply give age, salary requirement, and a complete resume of education and work experience. All replies will be considered confidential. Interview travel expenses and relocation expenses will be defrayed in the event of employment.

BOX 353, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY METALLURGICAL ENGINEER

Wanted—Foundry Metallurgical Engineer for nonferrous foundry. Must have experience on problems of gating, risering, pouring, sands and cores. B. S. Degree in Engineering required. Must have minimum of five years' experience. Age 25-45. Excellent opportunity for capable and energetic man. Salary open. Please reply stating your personal data, qualifications, experience, salary expected and availability in first letter. All inquiries will be held in strict confidence. Direct all correspondence to: AMPCO METAL, INC., PERSONNEL DEPARTMENT, 1745 SOUTH 38 STREET, MILWAUKEE 46, WISCONSIN.

FOUNDRY ENGINEER

A gray iron foundry research organization requires a technically trained foundryman interested in the application of results of research and development to foundry practice. Must have good knowledge of cupola operation and metallurgy of gray iron. Must be willing to travel. Excellent opportunity to acquire a broad knowledge of foundry practice. Send complete resume on education and experience together with salary requirements. Address: Box 351, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

PLANT MANAGER—INVESTMENT CASTINGS

New investment casting plant opened by established Midwest foundry. Experienced man required to assume complete responsibility for management of personnel, production, purchasing, tooling design, cost estimating. Must be strong in latest methods and metallurgy, ferrous and nonferrous. Send complete resume. Address: Box 332, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY SUPERVISOR

Well known and long established steel foundry requires the services of a man qualified to assume the responsibility for an entire slinger operation. The man selected must know gating and sand. He must have a top production record. Please state your age, education, experience, and salary requirements in your first reply. Address: Box 329, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

CUPOLA FOREMAN

For expanding basic steel producer and fabricator in Chicago. Age 30 to 45 with metallurgical degree or equivalent required as well as experience in the supervision of cupola operations, acid and basic practices. Excellent potential for advancement in our expanding facilities. Liberal employee benefit program.

In reply give age, salary requirement, and a complete resume of education and work experience. All replies will be considered confidential. Interview travel expenses and relocation expenses will be defrayed in the event of employment.

BOX 352, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

FOUNDRY SUPERVISION

Ohio manufacturer has openings for supervisors, thoroughly experienced in the foundry phases of producing sound cast iron sanitary ware castings for porcelain enameling.
Applicants must have had previous experience in cupola operations, pattern gating, sandslinger production work and must be able to furnish excellent references. This is a progressive company with an opportune future. Good salary, fine associates, and company fringe benefits are available. Write in full first letter. Confidential.

BOX 357, FOUNDRY

PENTON BLDG. CLEVELAND 13, OHIO

PRODUCTION MANAGER

Steel foundry in Northern California seeks man to fill position of PRODUCTION MANAGER. Applicant must be 30 to 40 years of age with a minimum of three years' foundry experience. Engineering background desired as well as thorough knowledge of patterns, sand, mechanization. Knowledge of CO_2 and shell cores preferable. Please submit resume of experience and education. Interested in salary desired and availability. Address: Box 348, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

STEEL FOUNDRY—METALLURGIST

Experienced in electric carbon steel basic practice. Position would include direction and supervision of Laboratory, Melt Department and Metallurgical functions. Forward resume of education and experience including salary requirements and availability. Address: Box 361, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN

Investment casting foundry on West Coast in process of expanding, offers fine opportunity for man 25-35 years of age. Applicant must have engineering background and preferably knowledge of ceramics or metallurgy. Minimum of two years' experience in industry required. Give complete resume of experience and education. Specify salary desired. Address: Box 346, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Steel foundry, located in Southwest has opening for young aggressive man. Must have B. S. Degree in Metallurgical Engineering. Submit resume of education, experience, marital status, also indicate salary requirements and availability. Address: Box 349, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Excellent opportunity for young man 25 to 35 years old. Experience in malleable iron preferred. Mechanized foundry located in Midwest. Write giving details of education, experience, availability and other requirements. Address: Box 342, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Help Wanted

FOUNDRYMAN

The kind of person we are looking for received an engineering degree 5 to 10 years ago. He has been spending his time learning and working in a foundry. He has been exposed to various foundry techniques, including shell molding. He is interested in learning more and in building a career through responsibility for complete projects.
Does your background and future outlook come close to this? If so, send us your resume (it will be completely confidential, and let's see if your future should be tied in with ours.
(Greater New York area.)

BOX 354, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

ASSISTANT SUPERINTENDENT

35-40. For modern midwest pattern shop employing approximately 50. To coordinate wood and metal departments. Prefer graduate Engineer with creative ability. Must be a top pattern maker and have sound human relations. Excellent future with top salary. Write giving complete background, enclosing recent snapshot.

MANAGEMENT RESEARCH, INC.
635 NORTH PENN STREET
INDIANAPOLIS 4, INDIANA

PLANT ENGINEER

Steel foundry in one of the fastest growing cities in the West seeks man 25-30 years of age for challenging position of Plant Engineer. Applicant must have engineering background as well as knowledge of equipment design, maintenance, etc. Minimum of one to two years required. Please submit resume of experience and education. Availability and salary desired also requested. Address: Box 347, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY FOREMAN

Brass foundry located in small town, Washington, D. C. area, needs experienced foundry foreman. Must be capable of supervising bench, machine, and shell molding, and all foundry operations. Excellent opportunity for right man. Address: Box 323, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CANADIAN WANTED

Old established Montreal firm selling foundry equipment has opening on sales staff for young man age 20-30. Write with pertinent details. Address: DREW BROWN LIMITED, 5410 FERRIER STREET, MONTREAL, QUEBEC, CANADA.

FOUNDRY METALLURGIST

Experienced metallurgist to assume position of Quality Control Manager. Must be capable of handling cupola operation, inspection, and customer complaints. Salary open. Send resume. Address: Box 343, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

METALLURGIST

Well established steel foundry in the East requires a metallurgist with experience in the manufacture of carbon, low alloy and stainless steel castings. Must be capable of assuming full charge of expanding metallurgical department. Attractive long term opportunity. Address: Box 341, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

IRON FOUNDRY METALLURGIST

Required for foundry service work. Must have thorough knowledge of cupola operation and metallurgy of cast iron. Malleable and ductile iron experience desirable. Must be willing to travel. Salary open. Furnish resume stating age, education and experience. Address: Box 305, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOREMEN

Detroit area Aluminum Foundry running superior quality work interested in good Core Room foreman, Foundry Foreman and/or General Foreman with proven record in production and discipline. Address: Box 324, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

HELP WANTED

C. & F. Supervisor. Must have experience with steel casting, carbon and low alloy, up to 3,000 lbs. and understand time study and incentive work. Salary open. Address: Box 306, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Positions Wanted

FOUNDRY SUPERINTENDENT
Technical background, good record of quality production. Good administrator, excellent labor relations. Experienced in all phases of gray iron foundry operation. Prefer modern shop with full authority for maximum results. Address: Box 330, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN
Age 56, mechanical engineer. Experience 25 years as superintendent and manager of jobbing and mechanized foundry. Desire connections with reliable firm. Now employed. Address: Box 339, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

OPPORTUNITY WANTED
Nonferrous foundryman desires a connection with a brass or light metals shop in which he can invest some capital plus the experience of years of supervision, research and quality control. Presently located in Eastern Ohio. Address: Box 368, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Graduate Metallurgist, knowledge of all phases of foundry operations, experienced in steel and gray iron, sands, melting, gating, patterns, core and cleaning room. Excellent labor relations. Presently employed. Desire permanent association with progressive firm. Address: Box 366, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER OR ASSISTANT MANAGER
Young metallurgist and foundryman looking for a growing, progressive, nonferrous foundry to which he can devote energy and ambition in exchange for lucrative future. Foundry experience includes supervision and research plus early trades training. Address: Box 367, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY ADMINISTRATOR—MANAGER
Fifteen years' experience in all phases administration, sales and operation. Desire to make a change. Address: Box 331, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER-SUPERINTENDENT
Practical gray iron foundryman, technically trained, graduate metallurgist with thirty years' broad background of experience producing quality castings in high production and jobbing. Well versed cupola, metal, sand control, modern methods. Desire contact with reliable organization needing services high calibre aggressive foundryman. Results produced at minimum costs. Address: Box 325, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

QUALITY CONTROL
Eight years' experience in the ferrous industry with technical sand control and metallurgical background, seeking affiliation with progressive company. Presently employed as quality control supervisor of laboratory and melting. Address: Box 355, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES MANAGER
Presently employed, desire change. Six years' experience as sales manager. Able to discuss all phases of steel castings. Excellent record in establishing new and volume accounts. Address: Box 327, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MALLEABLE CASTINGS SALESMAN
Graduate Metallurgical Engineer, age 44 with 15 years' experience as malleable foundry superintendent desires position selling malleable castings. Completely familiar with requirements of malleable casting users in Midwest area. An excellent opportunity for a progressive malleable foundry to acquire additional customers. Address: Box 321, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY MANAGER
Background of 25 years' work with iron, steel, and nonferrous foundries. Broad experience in supervisory and management capacities relating to production, sales, and labor relations. Mechanical and Metallurgical Engineer. Address: Box 326, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

STEEL CASTINGS SALES ENGINEER
Qualified career foundryman, age 45, with over 20 years of experience at the production and customer levels. Personable, energetic and familiar with processes of low carbon, high alloy and stainless steel. Also familiar with Zyglo and X-ray requirements of castings for services and A.E.C. Address: Box 356, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SALES REPRESENTATIVE
Can service accounts in pattern, foundry and metal supplies based on 22 years' experience in foundry operation. Have sales experience. Address: Box 371, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Employment Service

FOUNDRY PERSONNEL SPECIALISTS
National Placement and Procurement of
GENERAL AND PLANT MANAGERS, PLANT SUPERINTENDENTS, FOREMEN—ALL DEPARTMENTS, METALLURGISTS, ENGINEERS, CONTROLLERS, ACCOUNTANTS, SALESMEN, SALES MANAGERS, PERSONNEL DIRECTORS, PURCHASING AGENTS
Confidential Inquiries Invited
From Employers and Qualified Applicants
For Fast Competent Assistance Contact
DRAKE PERSONNEL, INC. **HARRISON 7-8600**
JOHN COPE, DIRECTOR **220 SOUTH STATE ST., CHICAGO, ILL.**

SALARIED PERSONNEL
$5,000-$30,000. This nation-wide service successful since 1927 finds openings in your field. Sells your abilities; arranges contacts. Present position protected. Write for details. Address: JIRA THAYER JENNINGS, P. O. BOX 674, MANCHESTER, VERMONT.

Positions Wanted

SUPERINTENDENT
Practical and technical 30 years' experience jobbing and production. Familiar with every phase of the foundry. Now employed. Address: Box 364, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

CASTING SALES
General foreman with 19 years' experience in medium gray iron foundry, 38 years old, married. Desire casting sales. Address: Box 337, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Progressive foundryman familiar with every phase of practical experience on all classes of work. Now employed. Would like to make change. Address: Box 316, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN
Steel or iron with over 20 years' varied experience in foundry operations. Desire supervisory or management position with progressive organization. Age 43, top physical condition. Address: Box 328, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRYMAN
Iron or steel, coat-off, sleeves-up type man, jobbing or mechanized. Newest and oldest type foundry practice. Castings up to 5 tons. Want opportunity to work hand in hand with an owner or top brass in smaller type foundry. If you have an opportunity or problems, let's talk about them. Address: Box 369, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR ASSISTANT
Metallurgical Engineer under 40 with gray iron and steel experience, seeks opportunity. Address: Box 336, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

SUPERINTENDENT OR MANAGER
Young foundryman thoroughly versed in all gray iron operations. Degree in Metallurgical Engineering. Interested in responsible position with opportunity. Address: Box 360, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MELTER
Electric furnace acid and basic practice, carbon and alloy steels, capable of taking complete charge. Address: Box 362, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

MANAGER—SUPERINTENDENT
Ferrous, nonferrous. Top qualifications and references. All phases. Age 39, 22 years' experience. Widely known throughout the industry. Address: Box 358, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

FOUNDRY CONTROLLER
Fifteen years' experience in ferrous foundries and heavy machinery. All phases of controls, systems, taxes, costs. Address: Box 370, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

POSITION WANTED
Widely experienced Cleaning Room Foreman available. Address: Box 363, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representatives Wanted

FOUNDRY MACHINERY EQUIPMENT SALES
National manufacturer seeks qualified representatives or agents to handle complete line of material handling equipment, conveyors and complete line of shell blowing and shell sand coating equipment. Several choice territories available. Liberal commission program. Write for interview and appointment.
BOX 345, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

SALESMAN WANTED
Young progressive Midwestern steel castings company needs traveling salesman or sales engineer for representation in five state middle west area. Either some formal engineering education or former casting experience desirable. Send recent snapshot along with experience data.
BOX 340, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CASTING REPRESENTATIVES
Investment foundry seeks to expand present sales force. Operation not large but has unlimited growth potential. Located in prime Midwest industrial area. Some familiarity with this type of product essential. Several choice territories still open. Commission basis. No objection to non-conflicting lines. Please give complete background in confidence. Our staff knows of this ad. Address: Box 335, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED
Foundry Supply Company requires services of Sales Representative to call on accounts in Western New York and Western Pennsylvania to sell supplies and equipment. Excellent opportunity for man with foundry experience and sales ability. Address: Box 334, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

TECHNICAL SALES REPRESENTATIVES
Should currently be selling to the foundry industry and be completely familiar with all methods of foundry operation. Background in steel casting technology preferred. Product is non-competitive. Several territories available. Please quote current representation and background. Address: Box 333, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

WANTED
Experienced nonferrous metal salesman, New England area. Reply advising experiences and other information pertaining to former or present condition. Address: Box 344, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

REPRESENTATIVE WANTED
We would like a man who is currently calling on pattern shops and foundries to sell a complete line of pattern lacquers. Address: Box 303, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Representative Available

ATTENTION
Gray Iron Foundries
Wonderful opportunity for you to expand your sales by furnishing gray iron castings (loaders, weights) for lamp and lighting fixture industry. Tremendous following and wholesale contact. I will represent you in New York, New Jersey, Pennsylvania and Connecticut areas. Commission basis. For further information write:
BOX 904
1501 BROADWAY
NEW YORK 36, NEW YORK

Foundry Consultants

HEVERLE & HAY
ENGINEERING—ACCOUNTING
CONSULTANTS TO INDUSTRY
(Since 1907)
COST CONTROL—COST REDUCTION
FOUNDRY METHODS
121 NORTH BROAD STREET
PHILADELPHIA, PA.

CONSULTING ENGINEER
Thirty-five years' Experience
Acid and Basic Practice

Improved methods in electric furnace melting. Low cost with high productivity. Avoid expensive mistakes. Acquire consultation prior to the purchasing of your new furnace and in planning, modernizing and organizing of your melt shop.

EUGENE H. WEAK **2933 HIGHWAY AVE.**
HIGHLAND, IND. **PHONE: TEMPLE 8-1244**

FOUNDRY CONSULTANT—NONFERROUS

Sand — permanent mold — centrifugal permanent mold—and centrifuge permanent mold. High pressure castings a specialty. Address: ED JENKINS, 253—8th STREET, WEST PALM BEACH, FLORIDA, PHONE: TEMPLE 2-8685.

CONSULTANT

East and Midwest. Specializing in melting, molding, cores, and sand problems. Address: Box 365, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Opportunity

PERMANENT MOLD METHOD AVAILABLE

THE WAGNER PERMANENT MOLD CO., 2910 Empire Ave., Burbank, California, has developed a Permanent Mold Method for ferrous and nonferrous metals and invites inquiries from any country regarding this method and process.

Foundry For Sale

FOUNDRY FOR SALE

7,000 square feet cement block foundry, one acre land, truck entrance and loading bay, outside Detroit, 8 miles Ford Dearborn, ¼ mile Expressway, one mile New Wayne Overseas Airport. Low taxes, focal point to industries. Sacrifice. Address: P. O. BOX 98, ROMULUS, MICHIGAN, TELEPHONE DETROIT, MAYFAIR 6-6168.

Foundries Wanted

WANTED

Iron, steel, or malleable foundry presently producing 35 to 60 tons per day. Prefer Ohio or Midwest. Will consider other locations. Will buy for cash.

BOX 350, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

STEEL FOUNDRY WANTED

We would like to buy a small to medium sized steel jobbing foundry in northwestern Ohio or notheastern Indiana. Address: Box 372, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

Wanted-To-Buy

FOUNDRY—WANTED—EQUIPMENT

Foundry investment organization needs used equipment to activate and mechanize a large foundry. Complete foundry with or without property will be considered. Please be specific as to price and when inspection can be made. Principals only. All replies confidential.

BOX 322 FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

WANTED

Used or broken Silicon Carbide Grinding Wheels of any kind or size, regardless of bond. Will pay $35.00 per ton.

UNION MINING COMPANY
2306 FIRST NATIONAL BANK BLDG.
PITTSBURGH 22, PENNSYLVANIA

PIN LIFTS

TWO FOR 60" x 70" FLASKS, 5,000 LBS. CAPACITY, 6" MINIMUM DRAW. ADDRESS: BOX 359 FOUNDRY, PENTON BLDG., CLEVELAND 13, OHIO.

MIXER WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price for immediate acceptance. Address: Box 578, FOUNDRY, Penton Bldg., Cleveland 13, Ohio.

For Sale

SAND BLAST EQUIPMENT
SELL-BUY-TRADE
GUARANTEED MACHINES
TERMS: 3 YEARS TO PAY

$70,000 worth new Pangborn and Wheelabrator parts. Priced 25% less than list.

6' LF-14 Pangborn Table	$2000.00
9' LG-14 Pangborn Table	4500.00
6' LG-14 Pangborn Table	2500.00
Pangborn 8 x 8 Room	2800.00
Pangborn 53 EN2 Hand cabinet	325.00
Pangborn Auto Peening cabinet	1100.00
48 x 48 Wheelabrator Tum. w/loader	4000.00
42 x 48 Wheelabrator Tum. w/loader	2500.00
27 x 36 Wheelabrator Tum. w/loader	3000.00
8' Wheelabrator Table Blast	2000.00
4' Wheelabrator Table Blast	2500.00
14 LG5 Pangborn Rotoblast Multi-table 4/5—5' tables	9000.00
Pressure Tanks, all types	150.00 up
Vapor Blast cabinets	400.00

All types and sizes of Hand Cabinets, Dust Collectors, Pressure tanks, Rooms, Horizontal or Blast Equipment too numerous to mention. Vertical Tumbling Barrels and additional Sand Blast Equipment too numerous to mention.

DIAMOND SALES, INC.
5654 W. Jefferson
Detroit 9, Michigan
VI-3-6750

REPAIR AND REBUILDING SERVICE ON ALL PNEUMATIC TOOLS

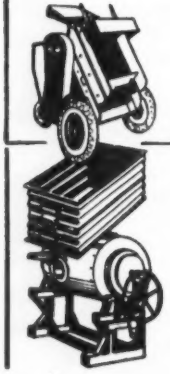
We try to carry a complete line of "Hard Chrome Rebuilt Tools" at about half the cost of new tools. Before you discard your old tools, why not send them to us for our estimate on the cost of renewing them with our Hard Chrome Process?

CENTRAL PNEUMATIC SERVICE COMPANY
512 LINDEN AVENUE
DAYTON 3, OHIO

FOR SALE
One Electric Despatch Oven

Complete with controls and motors. 48" wide, 80" high, 78" deep. Temperature 100-500°, 440 volt; A-1 working condition, can be seen in operation. Priced right for quick sale.

PALMYRA BASIC FOUNDRY, INC.
200-300 BLUFF STREET
PALMYRA, WISCONSIN



EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

14919 SARANAC ROAD **CLEVELAND 10, OHIO**

DUST COLLECTOR
1—Whiting Hydro-Clone, wet type, 4,000 c.f.m.

WHEELABRATORS
1—36" x 42", 11½ cu. ft. Tumblast, w/loader
1—42" x 48", 17½ cu. ft. Tumblast, w/loader
1—18 cu. ft. Pangborn Blastmaster

CRANE
1—Overhead CAB operated, 40 ft. span, 5 ton

MOLDING MACHINES
2—Rotalifts, 3160 and 3161
2—TDA4 Taccones

SAND SLINGERS
1—B-P Riddle type, 19" head, 4" tip
1—B-P Motive Jr., 19" head, 4" tip
1—B & P Dbl. Belt type, 19" head, 4" tip

SWING GRINDERS
10—10 H.P. Mummert-Dixon Model 1814
3—25 H.P. Safety Grinding Wheel Model 204

ELECTRIC FURNACE
1—350 lbs. Detroit Rocking

ASK FOR OUR COMPLETE LISTING — GLENVILLE 1-1222

Circle 871 on Page 53

For Sale

FOR SALE

1—Simpson #0 Muller—Style M (never used).
1—Lancaster Stainless Steel Counter-Current Batch Mixer, Type LW-62.
1—Lancaster Mixer, Model EBG-4.
1—Lancaster Mixer, Model EAG-3.
1—Ingersoll Rand Air Compressor, Type PRE-2, 24" x 16", 100# pressure with 300 HP motor.
3—Link Belt Roto-Louver Rotary Dryers, Models, 207-10; 310-16 and 502-20.

R. GELB & SONS, INC.
U. S. HIGHWAY 22, RAHWAY VALLEY R.R.
UNION, NEW JERSEY

FOR SALE

Pangborn Rotoblast Type ES-192, designed for cleaning of bath tubs. Unit complete with Schneible Collector, 825 gallon skim tank—two pumps. Blast cabinet 45' 6" x 11' 6". Seven rotors with 20 HP motors, 36 hooks on trolley conveyor—2 grit elevators, 6 separators. Spare parts inventory included. Unit offered on as is—where is basis.

RHEEM-RICHMOND PLUMBING FIXTURES DIV. RHEEM MANUFACTURING COMPANY
P. O. BOX 111
METUCHEN, NEW JERSEY
Attention: Purchasing Department

FOR SALE
MOTORS—GENERATORS
TRANSFORMERS
Unused—Rebuilt
WORLD'S LARGEST INVENTORY
ELECTRIC EQUIPMENT COMPANY
Phone station Collect GLenwood 3-6783
P. O. Box 51 — Rochester 1, New York

FOR SALE

172 Flasks 22" x 22" x 13" on 25½ Pin Centers
138 Flasks 22" x 22" x 11" on 25½ Pin Centers
In fair condition—reasonable

REYNOLDS MANUFACTURING COMPANY
600 NORTH PROSPECT
SPRINGFIELD, MISSOURI

FOR SALE

Four Herman Jolt Rollover Molding Machines, 40" x 68" Rollover Table. Good Condition.

BOX 338, FOUNDRY
PENTON BLDG. CLEVELAND 13, OHIO

CUPOLAS FOR SALE

We have outgrown and now offer for sale two cupolas.
1—#8 Whiting with Skip Charger
1—#9 Morris with Skip Charger
These furnaces have been taken down and stored on our yard ready for immediate shipment. For further information, call or write:

TYLER PIPE & FOUNDRY COMPANY
P. O. BOX 2027
TYLER, TEXAS

FOR SALE
DETROIT ROCKING FURNACE

Type AA with cylindrical shell, 1200 lb. cold or 2600 lb. hot metal, complete with mechanical and electrical equipment, oil filled Kuhlman transformer 11,000 volts primary, 125 volts secondary, 2800 amperes full load, installation drawings, unused and crated ten years. Ideal for alloy irons, brass or bronze. Price f.o.b. local cars $6,500.00. Address: HOPE ELECTRICAL PRODUCTS CO., 39 LONG AVENUE, HILLSIDE, N. J., ELIZABETH 4-7837.

FOR SALE

50 practically new Style ¼ND-18" x 53" x 9" cope x 8" drag Sterling HD rolled steel flasks. Address: EMMAUS FOUNDRY AND MACHINE COMPANY, INC., 4TH AND FURNACE STS., EMMAUS, PENNSYLVANIA.

FURNACES FOR SALE

Ten used heat treating furnaces and two 7-ton gantry cranes. Good condition, priced to sell. Address: **BAER STEEL PRODUCTS, INC., BOX 1428, BOISE, IDAHO.**

FOR SALE

MC 5 Serial 101 Shalco Shell Core Machine, $700.00. Address: FORT RECOVERY INDUSTRIES, INC., FORT RECOVERY, OHIO.

For Sale

FOR SALE

Simpson No. 1 Muller U. D.
Simpson No. 2 Muller
American Tumblast 15 x 20 rubber lined with dust collector
Fisher Furnaces #600 MNP
Fisher Furnaces #400 MNP
Campbell-Hausfeld Tilt Furnaces
Campbell-Hausfeld Stationary Furnaces
Stedman Core Crusher, Hammer Mill
Skip Hoist for 9½ Foot Cupola—complete
Osborn #405 Rollovers
Mold conveyor 268' long
Elevators
Belt Conveyors
Shakeouts
International Rollover RES
Milwaukee 163 Jolt Stripper
Champion JSL 12 Pin Lift, jolt
Osborn 710J, Pin Lift
Osborn 212J, Jolt Squeezers
Osborn 275J, Jolt Squeezers
Osborn 276J, Jolt Squeeze
International LSJ, Jolt Squeeze
International PJS, Jolt Squeeze
Milwaukee 104 Jolt Squeezers
Champion JS 108 Jolt Squeeze
Arcade 1008 Jolt Squeeze
Spo 110 Jolt Squeeze
Davenport Rollover 28 SA
International Rollover 30 x 8 portable
International Rollover 2410 G portable
International Rollover 30 x 8 no jolt
Tabor rollover 30 x 40 portable
J & J 610 B rollover portable
International pin lifts
Davenport pin lifts
Osborn 559 pin lifts
Spo 506 jolt rollover, pin lift, draw
International Type R core rollover, hand
Swing Grinders
Royer sand preparators
Simplicity preparators
B & P preparators
Blystone sand mixers
American Sand Cutters, Models M, AM, AA
Coleman core ovens
Porbeck core ovens
Grinders ½ hp to 25 hp
Disc grinders
Ladles from 50 to 10,000 lb.
Pouring Devices 500 lb. to 2000 lb.
Gyratory riddles
Monorail and bridges
Air Hoists 250 lb. to 10,000 lb.
Overhead chain conveyor #458, track, drives.
Blowers-Centrifugal-positive-exhaust
Dust collectors all sizes

FLASKS
ALUMINUM
SLIP and POP
Sizes from 10" x 10" to 48" x 48"
JACKETS
Aluminum and Iron
STEEL FLASKS
Sizes from 10" x 15" to 9' x 9'
CORE PLATES
Transite——Iron——Aluminum
MANY OTHER ITEMS IN STOCK
SEND US YOUR INQUIRIES
WE BUY—SELL—TRADE

THE HOMAN MACHINERY CO.
710 E. FRONT ST. MAIN 10339
CINCINNATI 2, OHIO

FOR SALE

1—Dextrex Degreaser with temperature controls, stream pressure regulator, 2 baskets, size 70" x 25" x 12". Purchased 1955, slightly used. Price $1200 total.
1—Rotary Lift Hoist, Model F5L2, purchased 1955, never used. Price $900.
1—PRE2 Ingersoll-Rand Air Compressor, 24 x 12½ x 14 stroke, 210 HP, 440 volt synchronous motor complete with exciter, Serial No. 40569-40570. Price $6000.
1—Type 10 Ingersoll-Rand Air Compressor, 17 x 10½ x 14 stroke, 150 HP, 440 volt belt driven motor, complete with reduce voltage compensator, Serial No. 36266-36265. Price $5000.
1—Type #25 Size 8000 CFH DX Surface Combustion Gas Generator purchased new in 1956. Price $5600.

ALBION MALLEABLE IRON COMPANY
ALBION, MICHIGAN

---

500 TONS
CAST IRON FLASKS
Sizes From 20" x 20" to 72" x 192"
Including Bottom Plates, Priced to Sell
For Information Phone or Write:

LOUIS JOSEPH COMPANY, INC.
P. O. BOX 325
CONNERSVILLE, INDIANA
PHONE 1895

BIG MOLDING MACHINES

●

2—SPO 2302 AUTOMATIC's NEW 1955; 30" squeeze cylinder, 12¼" draw; flask width 22¼" to 37½"; max. length 72"; 57000# squeeze pressure at 80#.

●

8—MILWAUKEE 2646's—NEW 1952 26" squeeze cylinder 13" draw; Flask width 25½" to 29" up to 52" length.

●

2—SPO 2222; 22" Jolt, squeeze, pinlift, squeeze cylinder; 36" x 58" table; 12" draw; 28,000# squeeze pressure. Electric push button.

●

SPO 2192R; 24" x 40" table; Electric push button; rollon-rolloff.

●

SPO 9546 Jolt Squeeze Rollover Draw.

●

2—MILWAUKEE 244-13 Jolt Squeeze Strippers

●

1—MILWAUKEE 214-28C Jolt Squeeze Strippers

ANY OF THESE MACHINES CAN BE PURCHASED FACTORY REBUILT

ACME EQUIPMENT CO., INC.

126 South Clinton Street
Chicago 6, Illinois
Phone Andover 3-3430

Circle 872 on Page 53

ANOTHER BIG ACME LIQUIDATION

HOOSIER IRON WORKS FOUNDRY

KOKOMO, INDIANA

OVER $750,000 SPENT ON EQUIPMENT SINCE 1953

BUILDING SOLD · EQUIPMENT MUST BE MOVED—NOW!

Aerators
Air Compressor, 6″ x 7″ Ingersoll Rand
40′ bucket elevator
½ and 1 yard clam shell buckets
Core assembly conveyor
Flask conveyors
Flat belt conveyors
100 Car 36″ x 54″ car mold conveyor, Link-Belt
3—LINK BELT 36″ PA Oscillating Conveyors 20′, 30′ & 35′
Spill sand conveyors
Trough conveyors
CORE BLOWERS — DEMMLER 4EO, 3EO, 2EO, #2, 2K, 2C, 3C, #55 CHAMPION CB15, CB18 REDFORD #1
CORE GRINDERS — Milwaukee and Stoney
Core Buggies
CORE OVENS — Mahler 4 compartment
CORE PLATES, aluminum and transite
CORE ROLLOVERS—B&P CR20-10, Rol-A-Cor, Sutter SP500F
CRANES 10 Ton Milwaukee 48′-6″ span
INSLEY CRAWLER
FLASKS—Hines
ANNEALING FURNACES
BELLEVUE INDUSTRIAL, Gas Fired pusher; 48″ x 18″ door; 20′ heating and cooling chamber.
HAGAN PUSHER TYPE: 1450°—1600# per hr.; 3′-3″ x 18″ door. Oil fired.
72″ Gardner Grinder
Air and electric hoists.
Laboratory equipment
Ladles and pouring devices.

MOLDING MACHINES

2-SPO 2302 Automatic Jolt Squeeze Strip Rollon, Rolloff—30″ squeeze cyl., New 1955
2—Milwaukee 244-13; 1—Milwaukee 214-28C
MULLER—SIMPSON #2 (3) Blystone's
Sand Bins
Belts
"RIPL FLOW" Screens 4 x 10
SHAKEOUTS—Simplicity 4′ x 10′ Link-Belt 4′ x 6′
TUMBLING MILLS (3) 48″ x 72″
WHEELABRATORS (2) 48″ x 42″

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"PLEASE ADDRESS ALL INQUIRIES TO LIQUIDATION OFFICE."

ACME EQUIPMENT CO., INC.

LIQUIDATION OFFICE: Phone Gladstone 9-4130, P.O. Box 492 • Kokomo, Indiana
Chicago Office & Warehouses • 126 S. Clinton St., Chicago 6, Illinois • ANdover 3-4330

Circle 873 on Page 53

Now Liquidating

Oliver Corporation's Gray Iron and Malleable Foundries at 533 S. Chapin St., South Bend, Indiana. LATE TYPE Foundry Equipment.

FOUNDRY

6—MULLERS, 5—B&P #80, 1—B&P #40
P & K Mix Muller, 24″
6—MOLDERS HOPPER LINES—100 Hoppers
8—"NO LEAK" Steel Slat Conveyors
1—MOLD CONVEYOR
20—Belt Conveyors, Trough and Flat Belt, some have magnetic pulleys, Royer NB-2-NRS; B&P Screenerator L&S
6—Revivifiers and Sand Screens
4—Overhead Sand Bins 1000 to 4000 cu. ft.
10—Shakeouts: Robbins, Simplicity, Link-Belt
5—Oscillating Pan Conveyors
6—Bucket Elevators 41 to 60 feet
B & P Slinger Turntable
100 — MOLDING MACHINES, JOLT SQUEEZE PIN LIFTS: SPO 2222, 2160, 2148, 2136, 214, 113J, and 110J; OSBORN 276J, ROLLOVERS: SPO 507, JOLT SQUEEZE ROLLOVER DRAW 413D, PIN PUSHOFFS B & P AL 2428, SPO 9546 Rollovers, SPO 2192R, Osborn Rotolift 3161.
7000′ Roller Conveyor 14″ to 26″

CLEANING ROOM

American Shot Blast, 2—48″ x 48″; 2—42″ x 36″; 4 Whiting geared motor drive tumbling barrels; 6 — HISEY WOLF Grinders 20″ and 18″ wheel sizes; Wood Stat. casting sorting conveyors
1—Whiting Hydroclone Dust Suppressors
3—Rotoclones—2 bag type Dust Collectors

CORE ROOMS

Core Blowers: 3—Demmler 2K, 2—Demmler #2; 4—Demmler #1; 1—Demmler #50; 2—International SB13; 9—Redford Bench type Rollover; 1—SPO 507; 1—International R.E.D.P.; 6—Hand Rollovers, Coleman Car type and Young Brothers continuous core ovens, core racks, core buggies

HEAT TREATING

2—General Electric 5 ton Electric Annealing ovens 1750° and 1350°

MELTING DEPARTMENT

Cupola—4—Whiting #7; 1—Whiting #6
1—Whiting Air Furnace; 2—30A Coal Pulverizers

WHITING HYDROARC ELECTRIC DUPLEXING FURNACE 4130# cold charge, 4160 volt, 1100 KVA

Whiting Tiger Charge Crane—3—Whiting U holding ladles. Overhead scrap storage charge and weigh hoppers. Canton Shear
3—Whiting, Allis Chalmers Cupola blowers. Whiting Slag Disposal Units. 36 Modern Pouring devices. Scales 100# to 12,500#

CRANES

2—Whiting 7½ ton 108′ Span OET Cranes
12—CLEVELAND Bridge Cranes, 800′ 10″ arch beam, 2000 feet "T" rail
15—CLEVELAND Hot Metal Carriers, 2600′—10″ and 12″ arch beam rail
11—Electric Monorail Hoists 1—5000#
STRAIGHTENING PRESS: 25 TON OIL GEAR
AIR COMPRESSOR—300 H.P. Synchronous Chicago Pneumatic

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LIQUIDATION OFFICE: Phone Atlantic 9-9263 533 S. Chapin St. P. O. Box 486 • South Bend, Indiana
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Circle 874 on Page 53

AAA MACHINERY & EQUIPMENT CO.

over 1000 satisfied customers

WORLD'S LARGEST INVENTORY OF GUARANTEED FOUNDRY EQUIPMENT

AIR COMPRESSORS

1—GARDNER DENVER ADR 6¼ x 3½ air cooled, 15 HP
1—AMERICAN Size 9 x 9, horiz. w/30 hp
1—KELLOG Model 350TV—5½ x 5", air cooled, 10 HP.

AIR & ELECTRIC HOISTS

85—I & R Air Motor type, sizes LC3, A, B, C, D, D-6 & E, 300, ½, 1, 2, 3 & 5 ton.
15—DETROIT Air Hoists, 1, 1½, 5 ton cap.
2—P&H and DETROIT Model LHR, 5 ton.
20—THOR air hoists, ½, 1 & 2 ton cap.
1—SHAW BOX 2 ton load lifter.

BUCKET ELEVATORS

12—LINK-BELT & JEFFREY, 30, 40, 50, 60 ft. cc, 10 x 7, 12 x 7, 14 x 7 16 x 8 buckets

CUT-OFF MACHINES

2—AMERICAN H-Rod Straighteners.
1—TABOR C10AF, 16" wheel, 10 HP.
3—TESSEMER H & I Sprue Cutters.

CORE BLOWERS

3—CHAMPION Model CB-10, CB-18, & CB-400. From 10 to 300 lb. Cores.
22—DEMMLER Model Nos. 1, 1E, 2, 2E, 2K, 3, 3E, 3K, 4, & 4E. From 10 to 100 lb. Cores.
7—INTERNATIONAL Model SB-11 & SB-13, SB-15H, 15 to 30 lb. Cores.
6—OSBORN Nos. 91, 92, 192 and 193. From 10 lb. to 75 lb. cores.
3—MILWAUKEE #3A Bench Type.
1—SAN-BLO Model CB-40-B 40# Cores.
1—SPO Model SC-10-DM, hollow core.

CORE OVENS

1—INDUSTRIAL "Revolving Carriers" continuous, 18" x 80" trays.
1—THERMONIC Model M800A Dielectric. Cap. 900#s per hour.
1—YOUNG BROS. 8' x 6' x 9' double door, rack type, gas fired.

CUPOLAS, BLOWERS & EQUIP.

1—SPENCER 150 HP 7500 CFM 48 oz.
6—I & R Centrifugal 30, 50, 85 and 100 HP, 3500 to 10,500 CFM w/blast gates.
1—MODERN No. 3½ Cupola.
1—CUPOLA Bondactor, style 1205-L.
1—WHITING No. 6 Cupola.

ROTO-CLONES WET TYPE

9—AMERICAN AIR FILTER Type N&W, Sizes No. 20, 24, 27, & No. 30, w/sludge ejectors, cap. to 30,000 CFM.

ELECTRIC MELTING FURNACES

1—TOCCO 20 KW Induction, 9600 cycles.
3—AJAX No. 100 & 300 Furnaces Only.
1—DETROIT Size CM — 4000# Cold Charge, 8000# Molten Metal, w/1000 KVA transformer.
1—DETROIT AA, 750# Cold Charge, 1500# molten metal w/400 KW transformer
1—AJAX 50KW M.G. Set w/Furnaces—3000 cycle.
2—AJAX 20KW Hi Frequency Converters.
1—TOCCO 75KW M.G. Set—9600 cycles.

GAS & OIL FIRED FURNACES

23—LINDBERG FISHER Model MNP electric Tilt. Sizes 150, 400, 600, 1000, 1700, 2000, & 2400#, alum. cap. Gas or Oil Fired.
29—LINDBERG & HAUSFELD Stationary, Sizes 100, 150, 200, & 550 capacity. Gas or Oil Fired.
1—LINDBERG #400 BBI hand tilt
1—LINDBERG #300, ATH, hand tilt.
1—STROMAN, Model "U," 600# Reverberatory Hand Tilt.
1—STROMAN DC "Dipout" 800# cap.
1—ECLIPSE E1000—Double Chamber Dry Hearth 1000# cap.
1—REDA #550 Hand Tilt.

HEAT TREAT FURNACES

2—L & N No. G57SUB48-10, Nitrading-Electric.
2—LINDBERG 2236EH pit type, 22" D x 36" H, elec.
1—LINDBERG 3360G17 pit type, 33" D x 60" H, gas
1—L & N "Homo" 14" D x 16" H, elec.
1—SURFACE Model LO 54 x 96 Box to 1850°.
1—LINDBERG 6084EH Pit Type 60" D x 84" H, 1250° Electric, 120KW.
1—INDUSTRIAL 3' x 21' Continuous "Circ Air"—1000° F.

GRINDERS

Swing Frame

1—MARSCHKE 20" x 10" wheel, 10 HP.
2—FOX No. 6, 24" x 10", 15 HP.
3—MARSCHKE 24" x 3" wheel, 15 HP.
2—U. S. ELEC. Model 24, wheel 24" x 3".
1—MUMMERT-DIXON #2420, wheel 24" x 3".

Snagging

2—U. S. #64, 20" x 3", 7½ HP. 4 speed.
2—SAFETY #174, 24" x 3" wheel 10 HP.
2—MARSCHKE 24" x 4" wheel, 20 HP.
1—U. S. #65, 30" x 3", 30 HP, 4 speed.
3—U. S. No. 62VS, 24" wheel, 2-7½ HP motor, variable speed

Core

2—MILWAUKEE 70-12, 70" dia. table.
1—STONEY Core Grinder. 16" dia. Wheel.

Horizontal Disc

GARDNER No. 124—53" wheel, 20 HP.
GARDNER No. 179, 70" dia. wheel, 40 HP.

LADLES

17—MODERN & WHITING Cylindrical Ladles, 275, 1500, 2450, & 3000 lbs. capacity. All Enclosed Gears.
37—MODERN & WHITING Lip Pour, Enclosed Gear, 1200, 1600, 2000, 4000, 6000, 7000, 8000 lbs. capacity.
7—MODERN & WHITING Mixing Ladles, 2 & 3 ton. Electric & Manual Tilting.

MOLDING MACHINES

Jolt Squeezers

37—OSBORN, SPO, MILWAUKEE, Portable & Stationary, 10" Squeeze Cyl.
13—OSBORN, MILWAUKEE & SPO Portable & Stationary, 12" Cylinder.

Plain Jolt

1—J&J 50 x 72 Table—5000# cap.

Jolt Rollover Pattern Draw

1—DAVENPORT 28-SA, 29" x 40" table.
1—DAVENPORT #24SA, 24" x 40" table.
3—HERMAN 1500 lb. Series, 26" x 48".
1—HERMAN 750 lb. Series, 20" x 30".
2—HERMAN 4000 lb. Series. 40" x 60".
14—INTERNATIONAL TYPE G, Sizes 20" x 8", 24" x 10", and 30" x 8".
2—J&J #612, 24" x 30" Table.
4—J&J #918, 44" x 54" Table.
1—J&J #815-B, 30" x 40" Table.
1—MILWAUKEE #167, 32" x 33" Table.
10—OSBORN #40 and 42 Core Rollovers.
1—OSBORN #442, 21" x 31" Table.
2—OSBORN #242W, 29" x 42" Table.
12—OSBORN #601 & 602, 30" & 36" Wide Flask, 10" draw, 750 lbs Cap.
2—OSBORN 643 Table 35" x 50"—2000#.
1—SPO #413D, 24" x 25" Table.
1—SPO Model 508, table size 28" x 30".
1—SPO 506—24" x 30" Table 10" Draw.
1—SPO 5050, Table 25" x 30", 10" draw
3—TABOR 30" x 40" Table, 12" Draw.
4—TABOR 22" x 42" table, 10" Draw.

Jolt Pin Lift

1—DAVENPORT 34AJS, 34" x 48" Table
3—INTERNATIONAL JDP 1600 X 10" draw, 36" x 36" Table.
2—J & J No. 688, 25 x 30 Table.
2—OSBORN #559, 25" x 30" Table.
2—MILWAUKEE #2542, 38" x 42" Table.
1—SPO #3058, 22" x 28" Table.
2—SPO #3070, Table 26" x 35"
1—TABOR, 22" x 32" table

Pin Lift

9—INTERNATIONAL & B & P Speed Draw. Used with Sand Slinger. Cap. 600 to 2000 lbs, up to 30" x 40" flasks.

Jolt Squeeze Pin Lift

1—MILWAUKEE #125, 21" x 27" Table.
3—MILWAUKEE No. 165, 24" x 30" table,
3—MILWAUKEE #196, 17" x 38" Table,
1—OSBORN #712-V, 18" x 26" Table.
2—OSBORN #710-J, 17" x 21" Table.
9—OSBORNS 714PJ, 29" x 31" Tables.
1—OSBORN 716PV, Table 22" x 34", 16" cyl.
4—INTERNATIONAL PKL, 17" x 26".
1—INTERNATIONAL PK-20, Size 20" x 8".
2—SPO 2192-R, 24" x 40" table, 19" cyl.
2—SPO #2114P, Table 21" x 27", 11" cyl.
2—SPO 2160-R, Table 24" x 30", 16" cyl.

CONVEYORS

Steel Apron

9—JEFFREY & LINK-BELT 24", 30", 36", widths. Lengths built to your specifications, with reducers & motors.

Oscillating & Vibrating

1—LINK-BELT 48" x 154', 20 HP Motor.
7—JEFFREY TAYLOR No. 5 Vibrating Feeders 24" wide x 7'.
LINK-BELT "FLEXMOUNT"
1—8" W x 50' L x 4" deep pan
1—12" W x 21' L x 4" deep pan
1—12" W x 26' L x 4" deep pan
2—18" W x 18' L x 4" deep pan

Roller

2500' MATHEWS 6", 12", 18" wide. 2 7/16" dia. roller, 1¼" hex shaft, 4" channel.
1500—MATHEWS 8" x 12" wide, 3½" dia. 1" hex shaft on 6" centers, 6" channel.

Mold

3—LINK-BELT 88 Cars 20" x 48", 350' track, with automatic dumping.

Belt

LINK-BELT & JEFFREY 18", 24" & 30" wide. Flat or trough idlers, all Timken bearings. Built to your specifications. Can be equipped with molders hoppers & Ploughs.

HOPPERS & STORAGE BINS

7—NATIONAL & LINK-BELT Storage Bins, 60 to 150 tons cap.
42—MOLDERS Hoppers 1½ ton cap.

SAND MULLERS

1—B & P #40, Speed Muller, 6 cu ft.
1—B & P #60, Speed Muller, 12 cu ft.
2—B & P #70, Speed Mullers, 18 cu ft.
1—B & P Speed Muller, 3 cu. ft. w/skip
2—B&P #80A—24 cu ft.
1—BESSER Paddle Type, 30 cu. ft.
2—CLEARFIELD No. 610 w/skip hoist loaders. 10 to 14 cu ft batch.
1—CLEARFIELD #404, 4 cu. ft. batch
1—DRAVO-DOYLE 6 cu ft cap, Port.
1—LINK-BELT 48" x 8' Paddle Type.
1—PEKAY No. 160-1-24 Mixer Muller, single stage for 24" belt, 230 TPH.
1—SIMPSON No. 1H Style UD—500#.
1—SIMPSON #1½, Style UD, 700 lb. w/loader.
2—SIMPSON #2, Style UD, 1500# w/loader.
3—SIMPSON #3, Style C, 3000 lb.
3—SIMPSON #3, Style UD, 3000 lb.
2—Mixer Muller, 6 cu ft paddle type.
1—LANCASTER No. EDG-4, 5 cu. ft.
2—B&P No. 3½ Mulbaro's.
1—FEDERAL 4 cu ft "Whirl-Mix" Muller.

SAND PREPARATORS

2—NATIONAL #3 Style C Aerators.
6—B & P Screenerators, Models S, M & L.
8—ROYER Models, NC-4, NDS, NDP, NRS.
6—AMERICAN Sand Cutters, Model M, Sizes 79/60, 89/70, 99/80. All late.
4—AMERICAN Model AA and AM, 45" & 60" Cutting Blade.
1—AMERICAN "Sand Master," 102"/70" Cutting Blade—1952.
2—MOULDERS' FRIEND 50" & 60" Brush.

SANDSLINGERS

1—B & P Motive Jr., 300 cu ft tank.
2—B & P Tractor Type 19" head & 16" head, 13' arms. Magnetic towers.
6—B & P Models DB Stationary Sand Slingers, 16", 19" and 22" heads, with 20, 25, 40 and 50 HP motors. All late.
2—B & P Swing Type Slingers 19" head.
4—B & P 8 ton plate feeders.
2—B & P 35 ton capacity plate feeders.
6—B & P Tanks for speed slingers.
1—B & P Motive Speedslinger, 16'6" arm, 9'6" ram, 27/40 HP, w/R & L arms, 320 cu. ft. tank

SHAKEOUTS & SCREENS

2—LINK-BELT 5' x 10', 6 ton cap.
3—SIMPLICITY 4' x 6' Model B
1—SIMPLICITY 4' x 8' Model D
1—SIMPLICITY 4' x 10' Model D.
1—SIMPLICITY 5' x 8', Model D.
1—NATIONAL ENG. 5' x 8' Hex Screen.
1—HEWITT-ROBINS 36" x 78" Vibrex.
1—SIMPLICITY 4' x 10' Model B, Single deck sifter screen, 10 HP motors.
2—ROBBINS 3' x 4' JF6—2000#.
2—ROBBINS 3' x 5' JF6—2000#.
1—ROBBINS 4' x 8' JF9—10,000#.
1—ROBBINS 6' x 10' JF11—20,000#.

SAND BLAST EQUIPMENT

2—AMERICAN 36" continuous Tumblasts
1—AMERICAN 20" x 27" w/dust collector.
1—AMERICAN 36" x 42", w/skip hoist.
2—AMERICAN 48" x 42", w/skip hoist.
1—AMERICAN 27" x 36", w/skip hoist.
1—AMERICAN 48" x 48".
1—AMERICAN No. 1-B Suction Cabinet.
1—AMERICAN #3 Tablast, 4—48" tables.
1—AMERICAN #1 Tablast, 7-14" tables.
1—PANGBORN #45, type MT Sand Blast Room 10' L x 8' W x 6' H.
1—PANGBORN Model 6-LF, 6' diameter plain table with dust collector.
1—PANGBORN 6LG-14 Multi-Table w/dust collector

LIFTING MAGNETS

1—MILWAUKEE 45" dia. 230 volts
1—OHIO 25" dia., 230 volts

TUMBLING BARRELS

13—SLY & WHITING. All late type units, with gearhead motors and built in magnetic brake, Timken bearings. Following sizes: 36" x 48", 24" x 48", 30" x 60", 42" x 72", 48" x 72", 48" x 96".

AAA MACHINERY & EQUIPMENT CO.

10900 CEDAR ROAD—CLEVELAND 6, OHIO—CALL SW 1-3900

THE ACME BARGAIN PAGE

BELTING
29" x 180' 24" x 152'
24" x 263' 24" x 120'

BLOWERS
INGERSOLL-RAND 10,000 cfm., 32 oz., 150 hp., 220-V.
GE 10500 cfm., 20 oz., 85 hp., 220 V.
GE 7500 cfm., 20 oz., 89.6 hp., 220-440 V.
GE Centrifugal 6200 cfm., 24 oz., 58 hp. motor
INGERSOLL-RAND 4000 cfm., 60 oz., 100/25 hp., 220-440 V.
NORTH AMERICAN 1050 cfm, 16 oz.
SPENCER 7350 cfm, 16 oz., 50 hp.
SPENCER 2850 cfm., 16 oz., 20 hp., 220-440 V.
SPENCER 2250 cfm., 16 oz., 15 hp., 220 V.
SPENCER 270 cfm., 8 oz., 3 hp., 220-440 V.
SPENCER 5500 CFM 32 oz., 220 V.

CONVEYOR OVERHEAD CHAIN
1700' JERVIS B. WEBB and LINK-BELT #678 with trolleys 36" centers. 2-5 hp. Variable speed caterpillar drives, & motor generator set, takeups and turns.

CONVEYOR
36" x 162' LINK-BELT Oscillating Pan 10 hp., 220-440 V.
36" x 53' LINK-BELT Oscillating Pan
17' BARBER GREEN Bucket Conveyor
30" x 25' Magnetic Belt Conveyor w/drives, 2 hp., 220-440 V.
18" x 10' Steel Apron Conveyor w/drives, 3 hp., 220-440 V.
16" x 120' Rubber Belt w/drives

CORE BLOWERS
DEMMLER #2, 20# cores
DEMMLER #2K, 20# cores
REDFORD #2 up to 5# cores
REDFORD Bench types, horizontal or vertical clamping
CB15 55# cores, Universal blow plate
C.B. 10 up to 12# cores, 4½" draw
DEMMLER #4 up to 250# cores
FEDERAL "SAN-BLO" CB 40
INTERNATIONAL SB15H, up to 150# cores. Hydraulic clamp and draw
INTERNATIONAL SB 13, up to 60# cores
INTERNATIONAL SB 12, medium sized cores
INTERNATIONAL SB 11, medium sized cores
6—OSBORN 193 up to 50# cores
OSBORN 2035-2 large sized cores

CORE GRINDERS
7—MILWAUKEE 70-9 & 70-12s
1—OWOSSO DE1-303 42" table

CORE OVENS TOWER
COLEMAN Vertical-Horizontal 9000# per hour
COLEMAN Vertical-Horizontal 6800# per hour

CORE PASTE OVENS
COLEMAN 28' Horizontal

CORE ROLLOVERS
INTERNATIONAL REDP Rollover 12" draw

CRANES
P&H 3 TON Electric Traveling DC motors 50' span
270' Crane Runway and Supports

CUPOLA GUNS
1—BONDACTOR #1250
BONDACTOR #1000

DUST COLLECTOR
PARSONS 40,000 cfm. cloth bag type

ELECTRIC MELTING FURNACES
SWINDELL 9' Dia. Top Charge cap. 3 ton steel 5 ton iron per hour, 3500 KVA 13800 volt transformer, complete in place

ELECTRIC MELTING FURNACES
SINGLE PHASE
1—DETROIT "LFA" 350# shell 13200 V.
1—DETROIT "LFC" 700# & 350# Tapered Shell 2300 V.
2—DETROIT "LFC" 350# Tapered shell 7200 V.

FURNACE TRANSFORMERS
1—"LECTROMELT" 800 KVA, 12000 V., 3 phase
1—WESTINGHOUSE 500 KVA, 11200 V., 3 phase
1—WESTINGHOUSE 2500 KVA, 13800 V., 3 phase

FURNACES NONFERROUS
CAMPBELL HAUSFELD Staty. pot type
1—HEVI-DUTY HD-181-S Pot type, Electric
2—400# FISHER Gas Fired Tilting Furnaces
4—600# FISHER Gas Fired Tilting Furnaces
1—600# FISHER Gas Fired Stationary Furnace
FISHER RB100 Gas Fired Crucible
3—CAMPBELL HAUSFELD Gas Fired 625# brass hand tilt
1000# STROMAN DC double dipout w/complete controls

GRINDERS, SNAG
FOX 24" x 2" Single Wheel 10 hp.
1—HAMMOND 24" x 2" x 12" 7½ hp., 220 V.
HAMMOND WR-2, 2 speed, 30" x 3" wheel

GRINDERS, SWING FRAME
MARSCHKE 24" x 3" x 12" 20 hp., 220 V.
U.S. 24" x 3" x 12" 15 hp., 220-440 V.
2—MARSCHKE 3 hp., 12" wheel
1—B&D 7½ hp.

GRINDERS, MISC.
PORTER CABLE BGS Wet-Dry Belt
U.S. #70 Combination 20" disc and 20" x 3" x 1½" wheel

HEAT TREATING FURNACES
HOLDEN #202 Electrode Type, Bright hardening annealing 1850°
DESPATCH DT36 Pit type 42" x 40" Electric
LINDBERG 48" x 48" x 72" Elec., 1250°, box type.

HOISTS
10 ton SHAW BOX electric hoist
4—INGERSOLL-RAND Air trolleys
1—500# INGERSOLL RAND LC-4
4—CLEVELAND 2000# Cab type hot metal carriers

LADLES
1—6000# Industrial Enclosed Gear Crane
3—2125# Industrial Enclosed Geared Crane

LADLE MIXING
4000# Industrial, Insulated

MOLD BLOWER
TACCONE TD4 24" x 32" flask

MOLDING MACHINES JOLT SQUEEZE PIN LIFT
3—#165-6B MILWAUKEE table, 24" x 30"
2—#125-3 MILWAUKEE table, 21" x 27" —12" cyl.
2—OSBORN 712 PJ, 18" x 21" table
1—CHAMPION JSL10P 18" x 21" table 6" draw
2—#2114 G. SPO table, 26" x 27"—11" cyl.

SPECIAL! FACTORY REBUILDING
8—MILWAUKEE 2646 Jolt Squeeze Strip rolloff — rolling molding machines 10" jolt cylinder; 1800# capacity, 26" Squeeze cylinder; 13" draw, Flask size 25½" to 29" wide, 52" long. New 1951. WILL BE FACTORY REBUILT.

JOLT SQUEEZERS
2—INTERNATIONAL, LJS12 16" x 20" table
4—CHAMPION, JS10P 18" x 21" table
2—OSBORN 275PJ

JOLT ROLLOVER DRAWS
1020 JOHNSTON & JENNINGS, 60" x 50" table
JOHNSTON & JENNINGS 918, 44" x 64" table, 20" draw, rollout table
1—1500# HERMAN 26" x 48"
2—750# HERMAN 20" x 30" table
2—INTERNATIONAL RJ 20" x 12"
3—SPO 9032

JOLT PIN LIFTS
2—INTERNATIONAL 1200-8 26" x 27" table, 8" draw

PIN LIFT PUSHOFF
CHAMPION 28" x 42" table
MILWAUKEE 620ND 20" x 24" table

MULLERS and MIXERS
2—#1 SIMPSON Mullers

SAND CUTTERS
1—ROYER MCZ-43

SAND SLINGERS
1—B&P Tractor, 19" heads
B&P 2 speed 40/25 hp. double belt
2—NEWAYGO super Handy Sandy sand handling systems. Like new

SAWS, BAND
30" LAIDLAW, Metal Cutting hydraulic feed
30" TANNEWITZ, 3 hp., 440 V.
42" TANNEWITZ, 5 hp., 220-440 V.

SAWS, CUTOFF
DELTA Abrasive cutoff

SCALE
FAIRBANKS PRINTOMATIC 6250#

SHAKEOUTS
3' x 5' ROBBINS
3' x 5' SIMPLICITY
5' x 6' SIMPLICITY
4' x 10' SIMPLICITY

SHOT BLAST
SLY #4, 20" x 20" w/dust collector

SPRUE CUTTERS
2—PERKINS #53 1¼" stroke
1—MILWAUKEE #85 TON

TESTING EQUIPMENT
ARLIN Automatic Rockwell, continuous type
COLEMAN 55 Spectrophotometer
TYLER ROTAP Testing Sieve w/screens

TUMBLING BARRELS
2—ROYERSFORD, 42" x 72", chain drive, late
WHITING 60" x 72" 20 hp. drive
SLY 42" x 42" x 64" 10 hp.

WHEELABRATORS
2—42" x 48" AMERICAN Skip Loaders
1—27" x 36" AMERICAN Skip Loader
AMERICAN Tablast 6-24" tables
AMERICAN Tablast 8-28" tables, late

WOODWORKING—PATTERNSHOP
GARDNER 30" DISC and Spindle Sander
JONES SUPERIOR 48" Double Disc
OLIVER 72DR Router or borer
BOICE CRANE 12" Planer
TANNEWITZ 30 & 42" Band Saws
1—YATES-AMERICAN 8" Joiner
2—OLIVER 180D Disc Sanders
1—WALLACE 8" Joiner
2—STATE 15" Disc Sanders
1—OLIVER 88D Table Saw
1—TANNEWITZ, Type U Table Saw
1—CRESCENT 24" Planer

EKSTROM CARLSON #540 Universal Router Mill Drill

WIRE STRAIGHTENERS
2—#2A CLIMAX ¼"

ACME

ACME EQUIPMENT CO., INC.

We will buy for cash a single piece of equipment or your entire plant

126 South Clinton Street • Phone: ANdover 3-3430 • Chicago 6, Illinois

MONA

UNIVERSAL REBUILT EQUIPMENT GUARANTEED

AIR COMPRESSORS
COMPLETE STOCK—BURY, PENNSYLVANIA, SULLIVAN, INGERSOLL-RAND —SEND YOUR REQUIREMENTS

BLOWERS
25—CENTRIFUGAL 16 oz., 2 to 5 HP
10—GE, WILBRAHAM-GREEN, FISHER Positive Pressure & Cent, Cupola Blowers

CLEANING EQUIPMENT & TUMBLING BARRELS
1—15" x 20" AMERICAN WHEELABRATOR, Rubber Belt
1—27" x 36" AMERICAN WHEELABRATOR TUMBLAST
1—36" x 42" AMERICAN WHEELABRATOR TUMBLAST
1—48" x 42" AMERICAN WHEELABRATOR TUMBLAST, w/loader
1—36" Continuous AMERICAN WHEELABRATOR, side discharge, two heads, Serial #A95643. New 1953. Used 2 months
2—PANGBORN Tableblasts, Model L-14, 6' dia. table w/6 2' aux. tables & w/dust collectors. Like New!
1—PANGBORN TABLAST, 8' Table, 2500#
1—SLY, Twin Unit, 40" x 24" Round, 10 HP
1—SLY, 68" x 32" Round
4—SLY, 48" x 36" Round

CONVEYORS
1—JEFFREY Car Type Mold, 23 cars, 109' track, cars 34" x 50"
1—LINK-BELT, CAR type mold, 114 cars, 403' track, car size 18" x 42"
4—SAND ELEVATORS. Various sizes
6—SAND BELTS, 10' ctrs. to 140' ctrs.
1—SIMPLICITY, 24" x 10" Feeder w/hopper, Model OA-10-JA2
2500 FEET—FOUNDRY TYPE ROLLER CONVEYOR—ALL SIZES

CORE BLOWERS
10—DEMMLER #1, #2, #2A, #3K, #4E
3—INTERNATIONAL SB-13
3—OSBORN #91, #192, #91-10
1—RANDALL MODEL "A." Bench Type
1—TACCONE #4D, 10" Draw Stroke Cyl.

CUPOLAS
1—SKIP CHARGER for #9 Cupola with scale and buckets
1—WHITING Skip Charger for #5 Cupola
2—WHITING #7, 7 ton cap. Never used. Fraction of cost!

DUST COLLECTORS
10—ROTOCLONE #12, Type N, #14D, #16W, #20D, #24W, #30W

FURNACES—DIRECT ARC MELTING
1—250 Lb LECTROMELT, Side Charge
1—3000# HEROULT
1—1 Ton HEROULT
1—3 Ton LECTROMELT, Door Charge
1—3 Ton SWINDELL Hyd. Top Charge, 3000 KVA Transformer, Latest Type

FURNACES—INDIRECT ARC
1—10# DETROIT
1—350# DETROIT LFA
1—750# DETROIT LFY, Conical Shell
1—1000# DETROIT AA, 300 KVA
1—3000# DETROIT C, 500 KVA

FURNACES—INDUCTION MELTING
1—3 KW, AJAX, Lab type, steel
1—35 KVA, AJAX SPARK GAP, High Freq., steel
1—175 KVA, AJAX, Brass
1—333 KW, AJAX, 1000# steel

REBUILT & GUARANTEED
BEARDSLEY & PIPER
#70 Speedmuller
15 cu. ft. batch with Cooling and Skip Loader

FURNACES—GAS & OIL
1—400# FISHER MNP, Gas Fired
1—400# ECLIPSE, Alum. Tilting, Gas
1—STROMAN, Gas, 1000# cap. Alum., auto control hyd. tilt.
1—STROMAN, Gas, 600 lb, "U" Type

FURNACES—HEAT TREAT
1—2' x 3' x 6', gas fired, 1800° F.
1—4' x 4' x 10' Gas Fired Annealing
1—20" x 36" L&N Draw electric
1—32" x 78" L&N Vapocarb, 83 KW
1—24" x 18" x 54" WESTINGHOUSE, 45 KW w/Endogas Generator

MOLDING MACHINES
Jolt Rollover Pattern Draw
2—J & J #1020, 50" x 60" Table, 3000#
1—J & J #918, 44" x 54" Table, 18" draw
3—J & J #815RB, 30" x 40" table, 1200#
1—HERMAN 10,000#, 48" x 109" table
1—HERMAN 6000#, 42" x 78"
1—HERMAN 3000#, 30" x 66" table
5—HERMAN 1500# to 30" x 48" tables
3—HERMAN 750# to 30" x 36" tables
2—INTERNATIONAL, 13" x 17" tables
1—OSBORN #602, 36" x 26", 900#
1—OSBORN #405, 3000#, flask size 64" x 57", 26" draw
1—OSBORN #42, 15" x 20", hand draw
4—TABOR 40" x 60", 1500 & 3000# capacity
2—TABOR 30" x 40" w/air clamps, 1000#
1—TABOR 22" x 42", pattern draw, shockless, portable, 600#
1—TABOR 20" x 30" w/air clamps, 1000#
2—TABOR 14" x 16" Rockover, 150#

Plain Jolt
2—DAVENPORT, table sizes 24" x 27", 30" x 30", 1200# to 1800#

Jolt Pin Lift
1—HERMAN #4317, 22" x 30" table
1—J & J #681-C, 30" x 25" table, 600#
1—MILWAUKEE #1536, 32" x 38", 1500#
1—OSBORN #559, 25" x 30" table, 6" draw, 1200#
2—SPO #305, 750 lb
1—TABOR 17" x 20" table, portable
1—TABOR 20" x 24" table, 600#

Jolt Squeeze Pin Lift
2—INTERNATIONAL PKL, 18" x 24" table, 12" sq., 5½" draw, stat.
1—MILWAUKEE #126, 21" x 27" table, 12" sq., 1200#, 8" draw
2—MILWAUKEE #163, 15" x 24" table, 11" sq., 1500#
5—OSBORN #712J, #712PJ, 18" x 28" table, 12" sq., 6" draw, stat. & port.
5—SPO #2114P, 21" x 27" table, 600#
5—SPO #2136G, 21" x 30" table, 800#

Jolt Squeezers
4—INTERNATIONAL #10 LJS, 17" x 20"
1—MILWAUKEE #104-5, 17" x 21", port.
1—NICHOLS #12 F-P, portable, 600#
31—OSBORN #275PJ, #275J, 17" x 20" tables, 10" sq., 400#, stat. & port.
3—OSBORN #276J, 17" x 26" table, 13" squeeze, 500# port.
2—SPO #110J, 17" x 20" table, port.
8—TABOR, 18" x 20" table

MATERIALS HANDLING
1—BYERS, Mobile Crane, BUDA Engine, 50' Boom, 5 ton w/magnet & bucket
1—CLARK, Fork Lift, Gas, 3,000 lb, capacity, Solid Tire
1—HOUGH PAYLOADER, Model HA, 1000# cap., hyd. lift, mech. dump

MULLERS AND MIXERS
1—B & P #40 Speedmuller, 5 cu. ft. batch
1—B & P #70 Speedmullor, 15 cu ft batch with cooling and skip loader
1—B & P, Conventional, SIMPSON type, 87½" Dia. arranged for cooling
1—CLEARFIELD #404, 4' Dia, 4 cu ft batch
1—CLEARFIELD #610, 6' Dia., 10 to 14 cu ft batch, w/loader
5—SIMPSON #0, U.D. 3' Dia, never used
1—SIMPSON #1, U.D., 4' dia., 4 cu. ft. batch
1—SIMPSON #2, 6' U.D. Dia, 14 cu ft batch
1—SIMPSON #3, 8' Dia. Unit Drive, with loader 20-25 cu ft batch
1—SIMPSON #3, 8' Dia. Open Gear, 20-25 cu. ft. batch

LADLES AND POURING DEVICES
Bottom Pour
2—MODERN Crane Type, 55" H x 50" top
1—MODERN Crane Type, 60" H x 60" top
Lip Pour
2—MODERN 20½" x 20½", covered, enclosed gear
1—WHITING 40" x 40" top dia. geared
Cylindrical
8—WHITING, 26" L x 25" dia, 1100# iron
7—WHITING 19" L x 22" dia, 600# iron
3—WHITING, 38" L x 28" dia, 2200# iron
Pouring Devices
11—WHITING, 650# to 2000# gross cap.

OVENS
1—COLEMAN, Oil, Drawer Type, 70" L x 57" H x 48" W
1—COLEMAN, Oil, Rack Type, 11' L x 7' H x 7' 10" W
1—COLEMAN, Gas, 2 Comp. and 5 drawers, O.D. 22" x 12' x 10'
1—GENRICH Elec., 3 drawer, preheating, auto-control, 9' H x 8' W x 6'7" L
1—GENRICH Electric, Rack Type, 7' W x 7' H x 5'3" L
1—PORBECK, oil, 5 drawer core oven
2—ROSS, Gas, 2 compartment, recirc., rack type, 6½' x 14' x 7'

SAND CONDITIONING
2—B & P Screenarator, Model "8" & "M"
1—JEFFREY Sanditioner, Portable, 10-15 tons/hour, 2 H.P. Motor
2—ROYER, NC-2, 10-15 tons/hr, 1½ HP motor
1—ROYER, NC-4, 10-15 tons/hr, 1½ HP motor
1—ROYER PREPARATOR, Comb. Model NDC, 25 ton/hr scrap removal, 8' x 8' hopper
1—ROYER, NDP 15-25 ton/hr, 2 HP

SAND CUTTERS
1—AMERICAN, 15 HP, 96/78 Reel
1—AMERICAN, 10 HP, 48" Reel
1—B & P Nite-Gang

SAND SLINGERS
1—B&P Stationary, Single Speed
1—B&P Tractor Type, 16" head

SHAKEOUTS AND SCREENS
1—SIMPLICITY Vibrex screen, 3' x 8'
1—ROBINS Vibrating Screen, 36" x 78"
1—SIMPLICITY 50" x 116" shakeout

TESTING EQUIPMENT
1—500,000 lb. TINIUS OLSEN Hydraulic Compression Testing Machine
1—BRINELL Hydraulic Direct Reading Hardness Testing Machine

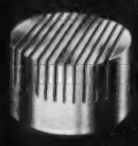
M'SCELLANEOUS
1—HOWE WEIGHTOGRAPH SCALE, Model 1700
1—KANE & ROACH WIRE STRAIGHTENER. Model DX-5
FLASKS CORE PLATES, All Sizes
1—TABOR Cut-Off Saw, 7½ HP motor
1—CLIMAX Model 2-A Wire Straightener
10 or 15 HP GRINDERS, Swing Frame
8—GRINDERS, Double End, Pedestal Type, U. S., Cin., Gardner, 5, 7½ & 10 HP

UNIVERSAL MACHINERY AND EQUIPMENT CO.

1632 N. Ninth St., Reading, Pa. **Phone: FRanklin 3-5103**

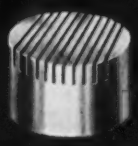
Send for Our FREE Catalog

SLOTTED CORE BOX VENTS



X-TRA DEEP HEAD .156 Wide Slots .014

SHALLOW HEAD .031 Wide or Narrow Slots .014 .010



DEEP HEAD .093 Wide or Narrow Slots .014 .010

CO_2 TYPE DEEP HEAD .093 Wide or Narrow .014 Slots .010

Manufactured by **C.M. SMILLIE & CO.** 1124 WOODWARD HGTS., FERNDALE 20, MICH.

INSERTING DRILL

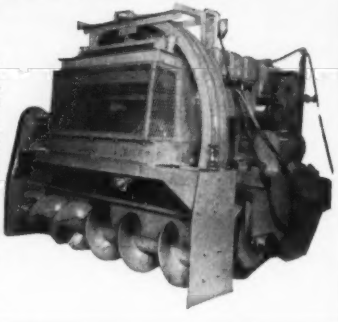
- MOST ECONOMICAL METHOD for INSERTING CORE VENTS
- CORRECT DEPTH
- UNIFORMITY OF HOLES
- FASTER INSERTION OF VENT

VENT CLEANER
- FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

Circle 694 on Page 53

REDUCE YOUR SCRAP
WITH BETTER MOLDS FROM RINGLIFT CONDITIONED SAND

All sand picked up, screened, cooled, magnetically separated, moistened, mixed and placed on floor in windrows. Clean, open sand that makes better molds. Up to a ton a minute. Low operating and maintenance costs. Send for literature.



STATES ENGINEERING CORPORATION
245 E. Murray St.
Fort Wayne, Indiana

Circle 695 on Page 53

Order From Your Foundry Supply House

TEX-VENT
Flexible TEXTILE Core Vent

New venting material for sand cores. Disintegrates completely if core is baked . . . leaves no residue. Allows unrestricted use of cold-setting processes.

DOMESTIC industries inc.
470 W. Broad St. Columbus, O.

Circle 696 on Page 53

COB FLOUR

greatly increases sand flowability. U. S. standard screen analysis: 40-200. Also COB GRITS and COB MEAL for airless blast cleaning and tumbling.

TI-CO INDUSTRIES, INC.
P.O. BOX 185 TIPTON, INDIANA
Phone or Telegraph:
FEderal 2-5942 Elwood, Ind.

Circle 697 on Page 53

CLASSIFIED ADVERTISING RATES

(*Effective July 1, 1956*)

POSITION WANTED—Minimum advertisement set solid, 30 words or less, $3.50. Additional words 15c each.

ALL OTHERS — "Help Wanted" — "For Sale" — "Wanted-To-Buy", etc., minimum advertisement set solid, 30 words or less, $8.00. Additional words 30c each.

NOTE—If replies are to be sent to a box number in care of FOUNDRY, add 8 words to your advertisement for box number and address.

Any advertisement set in all capital letters, add 50% to the above rates.

INCH RATES PER INSERTION

Single Column 2¼" Wide	One Time	Three Times	Six Times	Nine Times	Twelve Times
1 inch	$ 22.20	$ 21.00	$ 19.80	$ 19.20	$ 18.60
2 inches	43.20	40.80	38.40	37.20	36.00
3 inches	63.00	59.40	55.80	54.00	52.20
4 inches	81.60	76.80	72.00	69.60	67.20
5 inches	99.00	93.00	87.00	84.00	81.00
6 inches	115.20	108.00	100.80	97.20	93.60
7 inches	130.20	121.80	113.40	109.20	105.00
8 inches	144.00	134.40	124.80	120.00	115.20
9 inches	156.60	145.80	135.00	129.60	124.20
10 inches (1 col.)	168.00	156.00	144.00	138.00	132.00
15 inches (½ page)	243.00	225.00	207.00	198.00	189.00
20 inches (2 cols.)	312.00	288.00	264.00	252.00	240.00
30 inches (full page)	450.00	414.00	378.00	360.00	342.00

Remittance should accompany advertisement when submitted —Cash Discount 2%, 10 days.

Classified Forms Close the 13th of Month Preceding Issue

FOUNDRY

PENTON BUILDING • CLEVELAND 13, OHIO

Advertising Index

Abrasive Shot & Grit Co. 215
Acme Foundry Co. 182
Adams Co., The 28
Airetool Manufacturing Co. 162
Ajax Electric Co. 169
Ajax Electrothermic Corporation 169
Ajax Engineering Corporation 169
Allied Chemical & Dye Corporation, Semet Solvay Division 172
Allis-Chalmers 191
Alloy Metal Products, Inc. 113
American Air Filter Co. 18
American Optical Co. 104
American Smelting & Refining Co., Federated Metals Division 39
Arcair Co., The 196
Archer-Daniels-Midland Co., Federal Foundry Supply Division 6, 7
Atlantic Abrasive Corporation 150

Bay State Abrasive Products Co. 62, 63
Beardsley & Piper Division, Pettibone Mulliken Corporation 107, 131
British Moulding Machine Co., Ltd. 21
Budd Co., The 46

C & S Products Co., Inc. 58
Carman, Edwin S., Inc. 200
Carver Foundry Products 16
Cast-Master, Inc. 195
Centrifugal Casting Machine Co. 202
Chicago Manufacturing & Distributing Co. ... 158
Chisholm-Moore Hoist Division Columbus McKinnon Chain Corporation 173
Cincinnati Milling Machine Co., The 25
Cities Service Oil Co. 163
Clearfield Machine Co. 44
Cleveland Flux Co., The 109
Cleveland Tramrail Division, The Cleveland Crane & Engineering Co. 24
Cleveland Vibrator Co. 214
C umbus McKinnon Chain Corporation, Chisholm-Moore Hoist Division 173

DeBardeleben Coal Corporation 202
Demmler Manufacturing Co. 5, 149
Denver Fire Clay Co., The 189
Desmond-Stephan Mfg. Co. 10
Diamond Alkali Co. 200
Dietert, Harry W., Co. 199, 203
Domestic Industries, Inc. 212
DuPont, E. I., De Nemours & Co., Inc. 20
Durasteel Abrasive Co. 143
Durez Plastics Division Hooker Chemical Corporation 152, 153

Eastern Clay Products Department, International Minerals & Chemical Corporation ..5, 12, 15
Euclid Crane & Hoist Co., The 202

Fanner Manufacturing Co. 40, 41
Federated Metals Division, American Smelting & Refining Co. 39
F. E. (North America) Ltd. 111
Foundry Design Co. 147
Foundry Educational Foundation 177
Foundry Equipment Co. 127
Fuller Co. 52

Gardner-Denver Co. 120, 121
Globe Steel Abrasive Co., The 171
Great Western Mfg. Co. 201
Greenlee Brothers & Co. 42

Hanna Furnace Corporation, The 56, 57
Harbison-Walker Refractories Co. 133
Hartley Controls Corporation 190
Hercules Powder Co. 175
Herman Pneumatic Machine Co. 50, 51
Hevi-Duty Electric Co. 176
Hines Flask Co., The 19
Hooker Chemical Corporation, Durez Plastics Division 152, 153
Hough, Frank G., Co., The 161

Illinois Clay Products 11
Inductotherm Corporation 66
Industrial Saw Manufacturing 203
International Automation Corporation 31
International Minerals, Eastern Clay Products Department 5, 14, 15
International Nickel Co., Inc., The 1
Ironton Fire Brick Co. 187

Jeffrey Manufacturing Co., The 61
Joy Manufacturing Co. 183

Keokuk Electro-Metals Co. 160
Kirk & Blum Mfg. Co., The 168
Knight, Lester B., & Associates 170

Lectromelt Furnace Division, McGraw-Edison Co. 65
Lindberg Engineering Co., Lindberg-Fisher Division 26, 27
Lindberg-Fisher Division, Lindberg Engineering Co. 26, 27
Link-Belt Co. 144, 145

McGraw-Edison Co., Lectromelt Furnace Division 65

Macklin Co. 67
Magnet Cove Barium Corporation .....Inside Front Cover
Marshall, L. H., Co. 146
Maughlin, H. P., Co., The 214
Mayer, Carl, Corporation, The 48
Milwaukee Chaplet & Mfg. Co. 197
Modern Equipment Co. 216
Moltrup Steel Products Co. 199
Murphy, James A., & Co., Inc. 202

National Engineering Co. 151
National Metal Abrasive Co. 32
Neff & Fry Co. 202
Newaygo Engineering Co. 167
Nomad Equipment Division Westover Corporation 188
North American Refractories Co. 188
Norton Co. 22, 23, 114

Ohio Crankshaft Co., The 59
Ohio Ferro-Alloys Corporation 55
Oliver Machinery Co. 201
Osborn Manufacturing Co. 116, 117
Ottawa Silica Co. 60

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FOUNDRY is edited primarily for management, production, technical and purchasing personnel in foundries. A copy is sent at no cost to each metal casting plant in the U. S. and Canada employing 20 or more workers and to selected smaller foundries. Additional copies are sent to each foundry to the extent necessary to serve key foundry personnel on an individual or routed basis. A limited number of copies is supplied at no cost to educational institutions.
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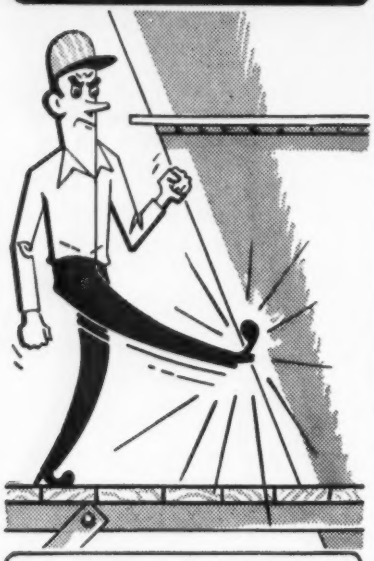
BIN STUCK LATELY?



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Free engineering service.

Write for our new literature.

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Circle 702 on Page 53

Advertising Index

Pangborn Corporation 43, 45, 47
Pekay Machine Co. 119
Penn Iron Works, Inc. 201
Penola Oil Co. 129
Pettibone Mulliken Corporation, Beardsley & Piper Division 107, 131
Pickands Mather & Co. 164
Picker X-Ray Corporation 159
Pittsburgh Coke & Chemical Co. 29
Planet Corporation 165

Raybestos-Manhattan, Inc., Manhattan Rubber Division 179
Reda Pump Co., Furnace Division 192
Redford Iron & Equipment Co. 30
Reichhold Chemicals, Inc. ..... Back Cover
Ridley & Co., Inc. 215
Royer Foundry & Machine Co. 137

Sall, George, Metals Co., Inc., The 193
Semet Solvay Division, Allied Chemical & Dye Corporation 172
Simonds Abrasive Co. 64
Smillie, C. M., & Co. 212
Smith, A. O., Corporation, Welding Products Division 8, 9
Smith Oil & Refining Co. 140
Spectrochemical Laboratories, Inc. 178
Spencer Turbine Co., The 194
Spraying Systems Co. 200
Standard Conveyor Co. 12
Standard Horse Nail Corporation 189
States Engineering Corporation 212
Sterling National Industries, Inc. 70, 193
Stevens, Frederic B., Inc. ..... Inside Back Cover
Superflux Mfg. Co. 190

Tamms Industries Co. 192
Taylor, Charles, Sons Co., The 68
Thiem Products, Inc. 69
Ti-Co Industries, Inc. 212
Timken Roller Bearing Co., The 49
Tomkins-Johnson Co., The 13
Towmotor Corporation 17

Union Carbide Metals Co., Division of Union Carbide Corporation 185
United States Graphite Co., The, Division of The Wickes Corporation 122, 123
United States Hoffman Machinery Corporation 125
United States Rubber, Mechanical Goods Division 103
Universal Clay Products Co. 203

Vanadium Corporation of America 157

Webster Manufacturing, Inc. 174
Westover Corporation, Nomad Equipment Division 188
Wheelabrator Corporation 2, 180
Whitehead Brothers Co. 37
Whiting Corporation 38
Wickes Corporation, The, The United States Graphite Co. Division 122, 123
Woodward Iron Co. 155

Classified Advertising 204, 205, 206, 207, 208, 209, 210, 211

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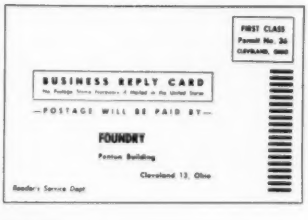
Circle 698 on Page 53



Use an Inquiry Card

For further information on anything described or advertised in this issue . . . . . .

SEE Page 53

Why LEADERS *Choose* THE RIDLEY ONE-MAN GUN

FOR DAILY CUPOLA MAINTENANCE

(1) THE ONLY TRULY ONE-MAN OPERATED GUN.

(2) YOU SAVE: LABOR, MAINTENANCE, MATERIALS.

(3) BACKED BY SOLID REPUTATION OF RIDLEY (Pioneer-Engineer) IN THE AIR APPLICATION OF REFRACTORY MATERIALS.

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PISTON RINGS - POWER SERVICE

HAGERSTOWN INDIANA U.S.A.

September 19, 1958

Mr. Richard L. Klosterman
Ridley and Company, Inc.,
11275 Massachusetts Avenue
Los Angeles 25, California

Dear Mr. Klosterman:

Ridley refractory guns are in use in our three Indiana foundries and our experience with them has been most satisfactory.

The convenience of one-man operation, with its resulting savings in time and labor, was the factor that first attracted us to the Ridley gun. We have since found that the large capacity of the Ridley gun, which eliminates repeated reloading, also results in a savings.

With your product, we are able to use a finer grain refractory material. We find this has cut waste since the material clings to the wall of the cupola. We have been able to cut lining time in half, and we anticipate longer service from our Ridley guns. Nozzle control, more power and a longer hose are other features we find to our liking.

At our Rushville foundry, where formerly we repaired cupolas with block, use of the Ridley gun has eliminated overtime and resulted in an actual savings of $15,211 in one year's time.

With such excellent performance, we're highly pleased with our Ridley refractory guns.

Sincerely,

Chesly E. Juday, Plant Manager
PERFECT CIRCLE CORPORATION
NEW CASTLE PLANT
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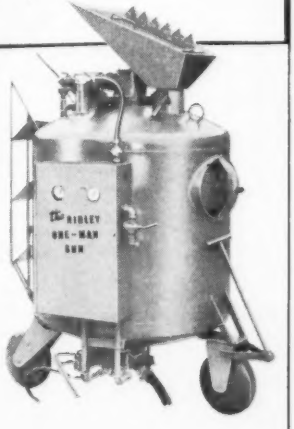

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LOS ANGELES 25, CALIFORNIA

The punishing impact of cleaning and peening operations calls for a metallic abrasive that can stand up and be counted.

The Blastrite line does that and more, simply because it's produced to consistently rigid specifications.

We have a small plant but we have large ideas about quality. You get guaranteed quality when you get Blastrite shot and grit.

Write for our catalog or outline your metallic abrasive requirements to our nearest representative.

Packaged the way you want it.

BUY BLASTRITE!

Steel • Pearlitic Malleable
"A" Iron • "B"
Chilled Iron • Drawn Steel

ABRASIVE SHOT & GRIT COMPANY
888 CAROLINA STREET
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Circle 699 on Page 53

Circle 700 on Page 53

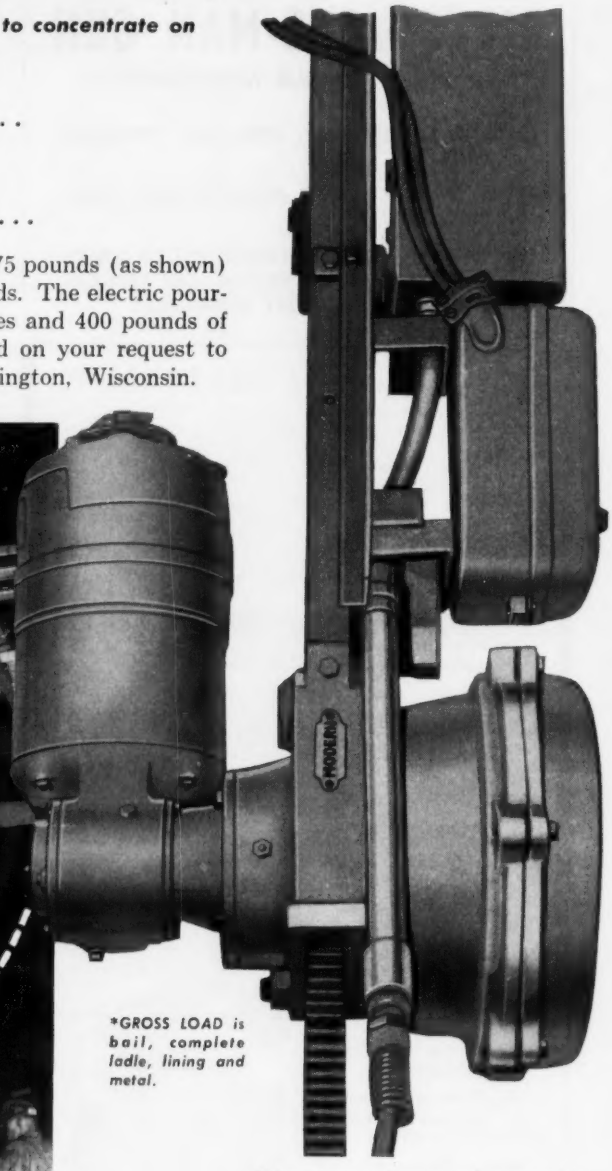
MODERN NEW ELECTRIC POURING!

Electrified pouring devices now are relieving many pour-off men from all lifting and load pushing. Whether your pouring progresses over synchronized conveyor lines (shown here) or on conventional pallets you can enjoy all these cost-cutting benefits;

- ***Less back-breaking work permits the operator to concentrate on faster more accurate pouring . . .***
- ***Fewer relief men are needed . . .***
- ***Higher tonnages are poured with less fatigue . . .***
- ***Chilling waste is nil . . .***
- ***Over-all quality of metal is higher . . .***
- ***Fewer accidents help to reduce insurance rates . . .***

Two sizes are available to handle *gross loads to 1275 pounds (as shown) and another with *gross load capacity to 2400 pounds. The electric pouring devices in operation here are handling 19" ladles and 400 pounds of molten metal. Complete information will be mailed on your request to MODERN EQUIPMENT COMPANY, Port Washington, Wisconsin.

Over-head traverse is synchronized with conveyor at Neenah Foundry Company. Tag-line may be substituted for conductor bars.



GROSS LOAD is bail, complete ladle, lining and metal.

Enlarged view of motor and gear section of new pouring device FAE — shown in operation here.

MODERN

MODERN EQUIPMENT CO., Dept. F-2, Port Washington, Wis.

- ☐ Mail bulletin on new, electric device . . . FAE-11-58
- ☐ Mail catalog on standard pouring devices and ladles . . . P-152-A
- ☐ Mail catalog on water-cooled cupolas and chargers . . . 147-C
- ☐ Ask representative to call.

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STREET .....ZONE .....BOX .....

CITY .....STATE .....

MY NAME .....

Circle 701 on Page 53

Down to the sea in TRITON...

CASTINGS MADE WITH STEVENS CO_2 BINDER

USS Triton, a radar picket submarine launched last August, is the largest undersea craft ever built and the first vessel in the world with twin nuclear reactor propulsion.

The Triton was built at Groton, Conn., by the Electric Boat Division of General Dynamics Corporation. Because high casting quality was an absolute essential, Stevens CO_2 Binder was used for casting such parts as sea valve bodies, manifold bodies, torpedo tube doors, and hatches.

With Stevens CO_2 Binder foundries get . . . Faster coating of sand grains, which means less binder used • Faster gassing of cores and molds • High scratch hardness • Longer bench life of sand mix • Improved shelf life of cores and molds • Better sand flowability • Minimum grain shedding • And the controlled quality that always gives the same results.

Call your local Stevens sales representative for full information.

frederic b. **STEVENS, inc.**

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INDIANAPOLIS MILWAUKEE NEW HAVEN SPRINGFIELD (OHIO)

Circle 552 on Page 53

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FOR BETTER CASTINGS FROM THESE METALS

REICHHOLD CUSTOMERS RECOMMEND THESE PROVEN PRODUCTS

METAL	RCI PRODUCTS	DESCRIPTION	OUTSTANDING FEATURES
IRON GREY MALLEABLE NODULAR HIGH ALLOY	**FOUNDREZ** 7101, 7102, 7103, 7104	LIQUID PHENOLIC CORE BINDING RESINS	HIGH HOT STRENGTH HIGH BAKED STRENGTH
	FOUNDREZ 7600, 7601, 7605	LIQUID AMINO CORE BINDING RESINS	RAPID COLLAPSIBILITY FAST BAKE — LESS SMOKING
	CO-RELEES 7300	LIQUID SAND CONDITIONER	EXCELLENT SAND WORKABILITY
	coRCIment 7990, 7991, 7992, 7993	LIQUID OLEORESINOUS CORE BINDERS	BROAD BAKING RANGE
	FOUNDREZ 7150, 7151	LIQUID PHENOLIC RESINS FOR SHELL COREMAKING	UNUSUAL STABILITY
	FOUNDREZ 7500, 7504, 7506, 7555	POWDERED PHENOLIC RESINS FOR SHELL MOLDING	SELF-ACTIVATION
	FOUNDREZ 7520	GRANULATED PHENOLIC RESIN FOR SHELL MOLDING	HIGH TENSILE STRENGTH
	COROVIT 7201, 7204	POWDERED ACCELERATORS FOR COROVIT OILS	NON-TOXICITY
	COROVIT 7202, 7203	LIQUID BINDERS (SELF-CURING)	EXCELLENT FLOWABILITY
STEEL STAINLESS LOW CARBON HIGH CARBON	**FOUNDREZ** 7104	LIQUID PHENOLIC CORE BINDING RESIN	EXCEPTIONAL STABILITY HIGH HOT STRENGTH HIGH BAKED STRENGTH
COPPER ALLOYS BRASS BRONZE	**FOUNDREZ** 7605	LIQUID AMINO CORE BINDING RESIN	FAST BAKE LESS SMOKING
LIGHT ALLOYS ALUMINUM MAGNESIUM	**FOUNDREZ** 7605	LIQUID AMINO CORE BINDING RESIN	RAPID COLLAPSIBILITY

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Your Partner in Progress

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Circle 553 on Page 53